Catalog 460

Price change 4/62

LEIMAN

Rotary AIR PUMPS for vacuum or pressure

LEIMAN BROS INC

146-181 CHRISTIE ST. NEWARK, N. J.

LEIMAN air pumps

What is an air pump?

An air pump is a machine for producing a smooth, continuous flow of air to be used for suction (vacuum) or pressure. This suction or air pressure may be used for lifting or holding objects, or for blowing or transferring materials, including liquids and gases.

How are air pumps used?

Where light materials such as paper, cardboard, thin metal, plastics, etc., in the form of sheets or small parts must be lifted or held in place temporarily, air suction applied to the object usually does the job better and more economically than a mechanical device. Where vacuums must be created, as in some filling or mixing operations, an air pump is the obvious solution. Where materials must be blown, liquids agitated, or gas pressures increased, an air pump will provide the needed pressure.

Where are air pumps used?

Since 1889, Leiman Rotary Positive Air Pumps have been used by the leading firms in many industries and for many different uses, some of which are listed at right. Other applications will suggest themselves to the design engineer and to the plant manager faced with finding a better way of handling a specific job. Air in the form of vacuum or pressure or both may be the most satisfactory and economical solution to the problem.

PACKAGING

- Bottle filling
- Disposal of waste from paper converting machines
- Wrapping machines
- Carton making
- Bag and carton filling
- Filling machines
- Molding machines, papier mache, etc.
- Can filling
- Transferring liquids
- Paper folding
- Labeling
- Paper fabricating
- Sealing machines
- Inspection operations

PRINTING, BOOKBINDING, and CONVERTING

- Printing presses
- Paper handling
- Gummed paper machines
- Manifolding machines
- Stereotype casting
- Bookbinding machinery
- Folders
- Ruling machines
- Inserting and mailing machines
- Gathering machines
- Tag making machines
- Gluing machines
- Printing frames
- Ink drying

METALS

Air for annealing, casting, hardening, tempering, melting, forging, cleaning, sand blasting, vacuum chucks, dust collecting.

SERVICES

- Milking machines
- Aspirating units
- Evaporating machines
- Fumigators
- Floor scrubbing units
- Fuel oil burners
- Distillators
- Embalming
- Carpet cleaning
- Food washing
- Sump cleaning
- Barrel cleaning
- Fur coat cleaning
- Dough-dividing machines
- Filtration
- Air conditioning
- Vending machines

MISCELLANEOUS

- Gas boosting and gas well boosting
- Chucking devices — paper, light metal, glass, etc.
- Dust collecting
- Evaporators
- Gasoline heater test stands
- Pump priming
- Testing for leaks
- Aerating liquids to quicken freezing
- Blowing
- Liquid displacement
- Spraying
- Disposal (hospital operating rooms)
- Carburetor production testing
- De-airing ceramics (air bubble removal)
- Feeding machines of all types
- Sampling gas or liquid
- Aerating dry materials
- Gas furnaces
- Dusting
- Glass blowing
- Pneumatic controls
- Instrument testing
- Cleaning
- Machine controls
- Distillators
- Holding devices
- Speed counters
- Oil reclaimers
- Textile machinery
- Atomizing — wax and bronze sprayers
- Generating gases from liquid fuels
- Sewage ejectors

The Advantages of

LEIMAN Rotary Positive Pumps

There are three common types of air pumps used in industry today — the straight line piston or reciprocating — the centrifugal fan — and the rotary positive. The reciprocating type pump is used where high pressure or vacuum is required — that is, beyond the range of the rotary positive type. This reciprocating type must have valves. It requires renewable piston rings to compensate for wear and air reservoir to smooth out pulsations in order to produce as steady a flow as the rotary type.

The centrifugal fan type is used where only ounces of pressure are needed, because this type cannot be used efficiently where a pipe smaller than the size of the inlet and outlet is to be used. The pipe sizes are relatively large when compared with the rotary type. The fan type must be operated at high speeds, resulting in greater wear at the bearings. Fans are noisy at these high speeds and their operation is less efficient due to greater air slippage between fan and housing.

The Leiman rotary positive type is to be preferred for work within its capacity as to volume, pressure or vacuum, because of the even and continuous flow of air or gas. The air or gas may be taken directly from these rotary pumps without the use of a storage tank.

The advantages of the Leiman rotary type over reciprocating pumps are that they deliver a continuous flow of air practically free from pulsations, avoid reciprocating complications, are simpler in construction, are much smaller in dimensions for a given capacity, occupy less space, and cost less to install and maintain. They are designed for applications where mercury vacuums are required up to 29.9 in. and pressures up to 20 lbs. per square inch.

Since 1889, Leiman Rotary Positive Air Pumps have been serving the largest original equipment manufacturers in the U.S.

Serving them with dependability, economy and job utility.

range

Leiman Air Pumps are precision designed for producing a smooth, non-fluctuating flow of air in either suction (vacuum) or pressure operations. The wide range of designs covers displacements from 2.4 CFM to 162 CFM, pressures to 20 lbs. and vacuum to 29.9".

application

The universal acceptance of Leiman Pumps is due, in part, to the extensive range of applications covered. Vacuum pumps for holding or lifting paper, plastics, light metals or mixing operations. Pressure pumps for blowing materials, agitating liquids or increasing gas pressures. These are just a few of the many industrial processes where Leiman air pumps operate more efficiently than mechanical devices.

construction

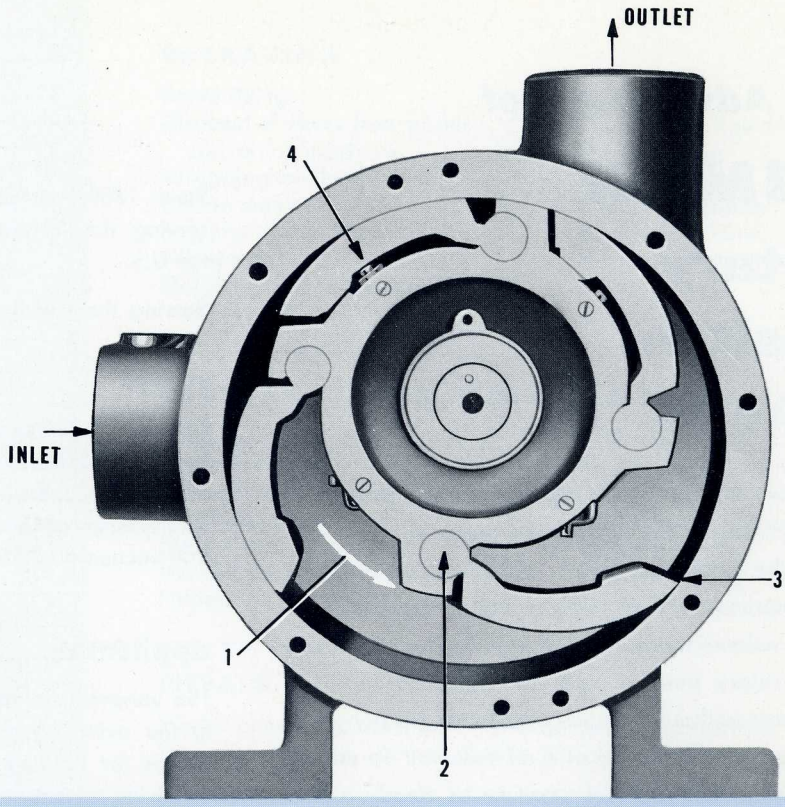
Both styles of Leiman pumps have cast iron cylinders; therefore, the rotating vanes have the effect of honing the inside surface of the cylinder. In a short time, this inside surface is smooth like glass, insuring smooth operation and lifetime wear. As the unique construction of Leiman pumps demands that the wing tip be in contact at all times, the wings wear in conformity. This guarantees full capacity, even after years of service.

The Leiman Rotary Type pump is smaller in dimensions for a given capacity than a reciprocating type pump, occupies less space, and gives practically pulsation-free service. Since vacuum may be obtained at the inlet and pressure at the outlet, one pump can be used where two were required, without the need of reversing rotation.

service

Leiman Bros. maintain a skilled staff of engineers available for consultation, estimating and solving design and installation-maintenance problems. This service is offered, without obligation, in the interests of service and satisfaction.

4-wing type pumps



vacuum up to 20″ Hg.
pressure to 15 P.S.I.G.

1. **Direction of rotation showing how extended wing scoops up the air at the inlet and carries it around to the outlet.**
2. **The easy-action hinge enables wing to open and close by the action of centrifugal force.**
3. **Wing and cylinder surfaces become hard and glassy-like, insuring a perfect fit and positive pressure or vacuum. There are no composition tips to require frequent renewal.**
4. **Enclosed stud in piston holds wing close to cylinder at top on largest pumps.**

Inlet and outlet threaded for standard iron pipe. Can be used as either vacuum or pressure pumps. This applies to all above. Cylinder, rotor and vanes are cast iron.

bearings

For pumping air, standard bearings are plain cast iron on all air cooled, curved wing pumps excepting the C3, C6 and all double cylinder pumps excepting the B2X2, and are lubricated by means of felt pads located in the bearing housing. The felt absorbs the lubricating oil, thereby assuring a constant supply to the shaft.

For pumping gases, a stuffing box type of bearing is used. This has an adjustable nut and packing gland on the shaft of the pulley side and the opposite side (the blind end) has a closed bearing.

Models C3 and C6 have roller bearings.

water cooled

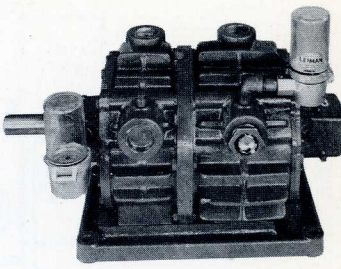
Air subjected to pressure or the presence of a high degree of vacuum will heat up a pump. The hinged wings of the 4-wing type are not affected by the metal expansion, because they open and close on the hinges with very little action. As an extra precaution against heat, certain pump sizes are built with air cooling fins. Other sizes which operate under the most extreme conditions are equipped with water cooling jackets.

features

- **double cylinder (one pump replaces two)**
- **hinge socket swings easily (takes up own wear)**

double cylinder

SPECIFICATIONS — for higher vacuum up to 29.9" see page 14



Can be used where both blowing and suction are needed simultaneously.

size of pump		B-2 x 2		B-2 x 3		C-3 x 3		C-3 x 4½ narrow pump	C-3 x 4½ wide pump	C-3 x 6 narrow pump	C-3 x 6 wide pump	C-4½ x 6 narrow pump	C-4½ x 6 wide pump
cu. ft. per min. displacement		8.5	8.5	8.5	12.7	15	15	15	22.5	15	30	22.5	30
speed in rev. per minute		600		600		400		400		400		400	
inlet and outlet pipe tap		¾"		¾"		1"		1"		1"		1"	
weight (in pounds)		54		58		85		100		130		145	
(Hg.) VACUUM HORSE POWER	at 6"	.32		.32		.42		.42		.42		.65	
	at 10"	.42		.42		.60		.60		.60		.9	
	at 15" inter.	.50		.50		.86		.86		.86		1.2	
	at 15" steady	.51		.51		1.		1.		1.		1.5	
	at 20" inter.	.62		.62		1.		1.		1.		1.5	
	at 20" steady	.75		.75		1.		1.		1.		1.5	
(P.S.I.G.) PRESSURE HORSE POWER	at 3 lb.		.32		.50		.42		.65		.89		.89
	at 5 lb.		.42		.75		.60		.90		1.2		1.2
	at 10 lb. inter.		.62		1.0		1.0		1.5		2.0		2.0
	at 10 lb. steady		.75		1.0		1.0		1.5		2.0		2.0
	at 15 lb. inter.		.75		1.0		1.5						

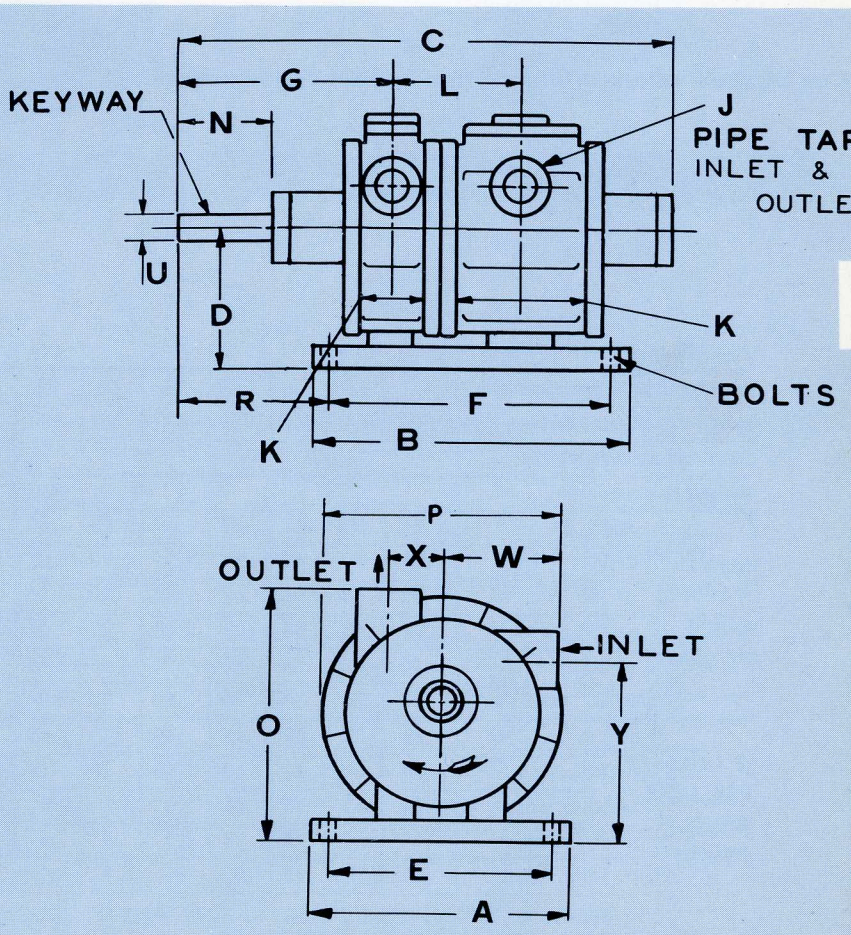
Double cylinder: To obtain Total HP Reqd. add the HP Figures for both Vacuum & Pressure desired and select next larger size HP Motor. Narrow pump used for Vacuum — Wide pump used for Pressure.

dimensions in inches

Dim. Letter	B - 2 x 2	B - 2 x 3	C - 3 x 3	C - 3 x 4½	C - 3 x 6	C - 4½ x 6
A	6¾	6¾	7	8	7	8
B	5⅜	5⅜	9¼	12	12	14
C	13½	14½	14⁹⁄₁₆	18⁹⁄₁₆	18⁹⁄₁₆	19¹⁷⁄₃₂
D	4⁹⁄₃₂	4⁹⁄₃₂	5⁷⁄₁₆	5⁷⁄₁₆	5⁷⁄₁₆	5⁷⁄₁₆
E	5¹¹⁄₁₆	5¹¹⁄₁₆	6	6	6	6
F	4⁵⁄₁₆	4⁵⁄₁₆	9¼	11	11	13
G	7½	7½	7	7	7½	8³⁄₃₂
J	¾	¾	1	1	1	1
K	2 & 2	2 & 3	3 & 3	3 & 4½	3 & 6	4½ & 6
L	2½	3½	4⅛	4⅞	5⅝	6⅜
N	4	4	3⁹⁄₁₆	3⁹⁄₁₆	4⅛	4³⁄₃₂
O	7⅜	7⅜	9⅜	9½	9⅝	9⅝
P	7⁵⁄₁₆	7⁵⁄₁₆	8¹⁵⁄₁₆	9	9⅛	9⅛
R	6⅝	7³⁄₃₂	4⁷⁄₁₆	4⁵⁄₁₆	4⁵⁄₁₆	5¼
U	¹³⁄₁₆	¹³⁄₁₆	1	1	1⅛	1⅛
W	3⅞	3⅞	4⁹⁄₁₆	4⁹⁄₁₆	4¹¹⁄₁₆	4¹¹⁄₁₆
X	1¼	1¼	1¹⁵⁄₁₆	1¹⁵⁄₁₆	1¹⁵⁄₁₆	1¹⁵⁄₁₆
Y	3⅞	3⅞	6¹³⁄₁₆	6¹³⁄₁₆	6¹³⁄₁₆	6¹³⁄₁₆
Keyway	Flat	Flat	¼	¼	¼	¼
Bolts	⅜	⅜	½	½	½	½
Type Brg.	C	C	R	R	R	R

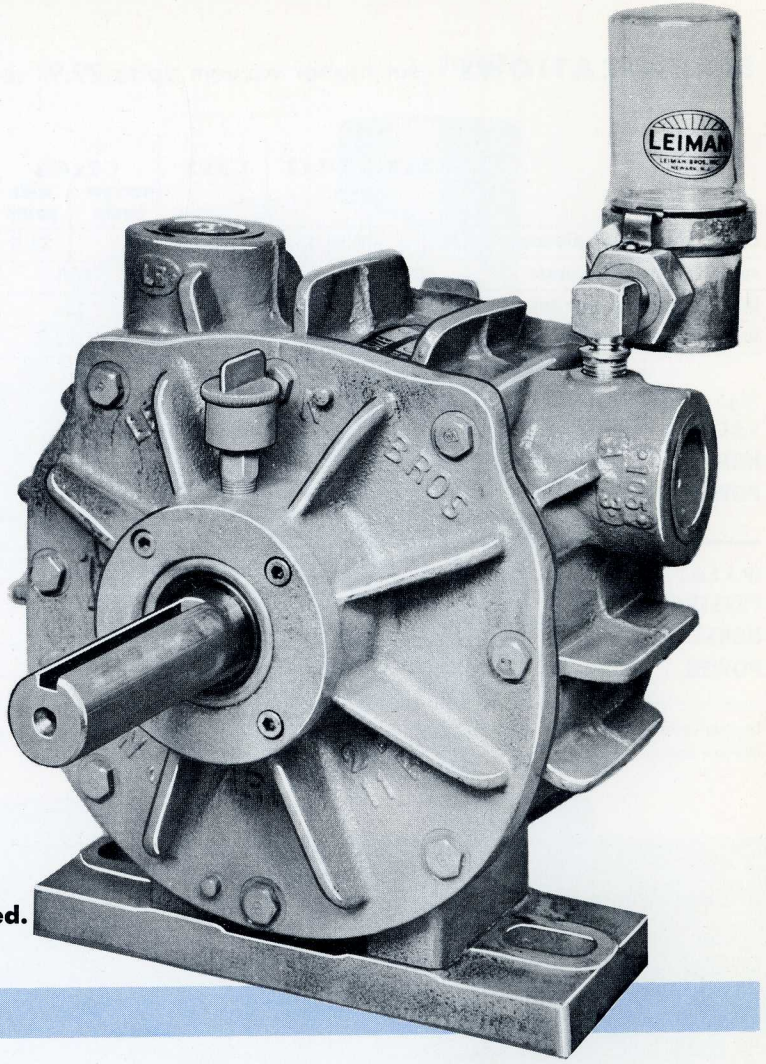
NOTE: C = Cast-Iron Felt Packed Bearing

R = Roller Bearing Type



For Performance Chart see pages 8-9

4-wing type pumps



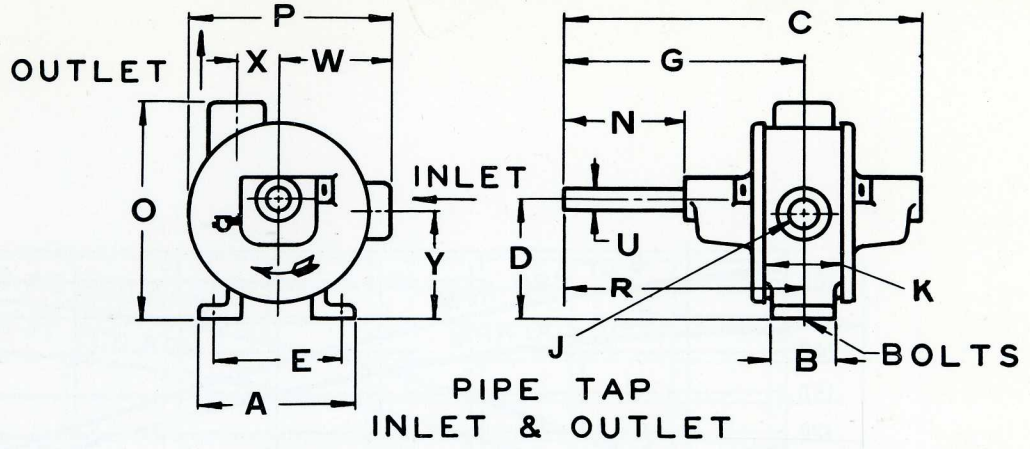
Can be used where either suction or blowing is needed.

size of pump		B				C		C-3	C-6		E		F-8		G	
cu. ft. per min. displacement		5.7	8.5	10	11.4	15	18	22	30	37	61	73	105	115	147	162
speed in rev. per minute		400	600	700	800	400	500	600	400	500	250	300	200	220	200	220
inlet and outlet pipe tap		¾"				1"		1"	1½"		1½"		2"		2½"	
weight in pounds		27				38		40	60		119		288		303	
(Hg.) VACUUM HORSE POWER	at 6"	.21	.30	.34	.40	.38	.50	.60	.80	.90	1.5	1.8	3.0	3.3	3.9	4.3
	at 10"	.27	.40	.45	.54	.54	.70	.83	1.08	1.35	2.1	2.5	4.1	4.5	5.6	6.2
	at 15" inter.	.32	.48	.56	.63	.78	.90	1.08	1.44	1.80	3.0	3.6	5.8	6.4	7.2	7.9
	at 15" steady	.32	.48	.56	.63	.78	.90	1.08	1.44	1.80	3.0W	3.6W	5.8W	6.4W	7.2W	7.9W
	at 20" inter.	.40	.56	.66	.80	.90	1.20	1.44	1.80	2.25	3.6	4.3	7.3	8.0	8.2	9.0
	at 20" steady	.40	.56	.66	.80	.90	1.20	1.44	1.80	2.25	3.6W	4.3W	7.3W	8.0W	8.2W	9.0W
(P.S.I.G.) PRESSURE HORSE POWER	at 3 lb.	.23	.33	.39	.45	.45	.55	.65	.92	1.1	1.5	1.8	3.0	3.3	3.9	4.3
	at 5 lb.	.30	.44	.52	.60	.63	.78	.92	1.2	1.5	2.1	2.5	4.1	4.5	5.6	6.2
	at 10 lb. inter.	.44	.65	.75	.88	1.0	1.4	1.6	2.0	2.5	3.6	4.3	7.3	8.0	8.2	9.0
	at 10 lb. steady	.44	.65	.75	.88	1.0	1.4	1.6	2.0	2.5	3.6	4.3	7.3W	8.0W	8.2W	9.0W
	at 15 lb. inter.	.52	.78	.92	1.0	1.4	1.7	2.1								

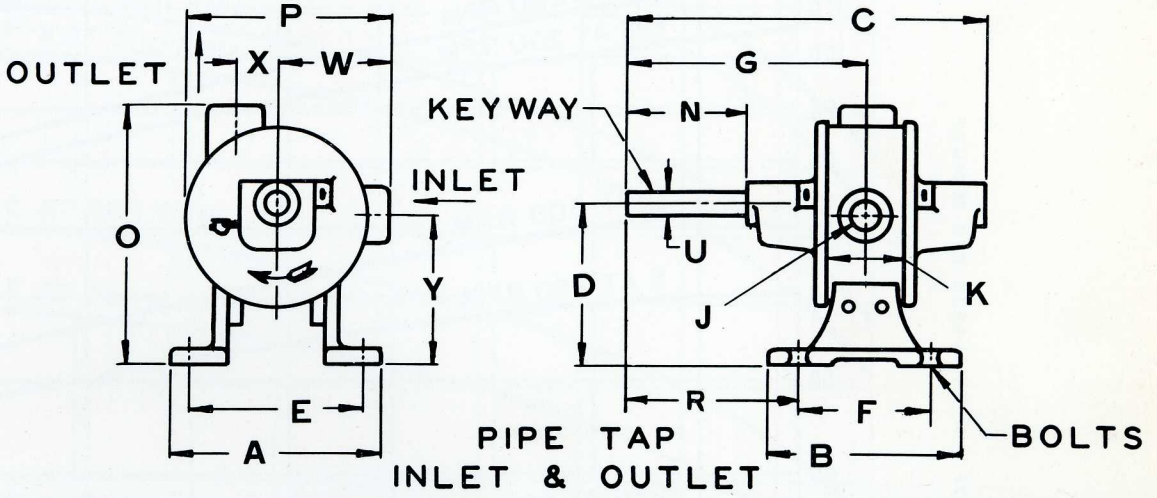
W—these pumps are water cooled when used for steady service of more than ½ hour.
Inter.—intermittent. Not more than ½ hour at a time.

single cylinder

Sizes B to C-3



Sizes C-6 to G



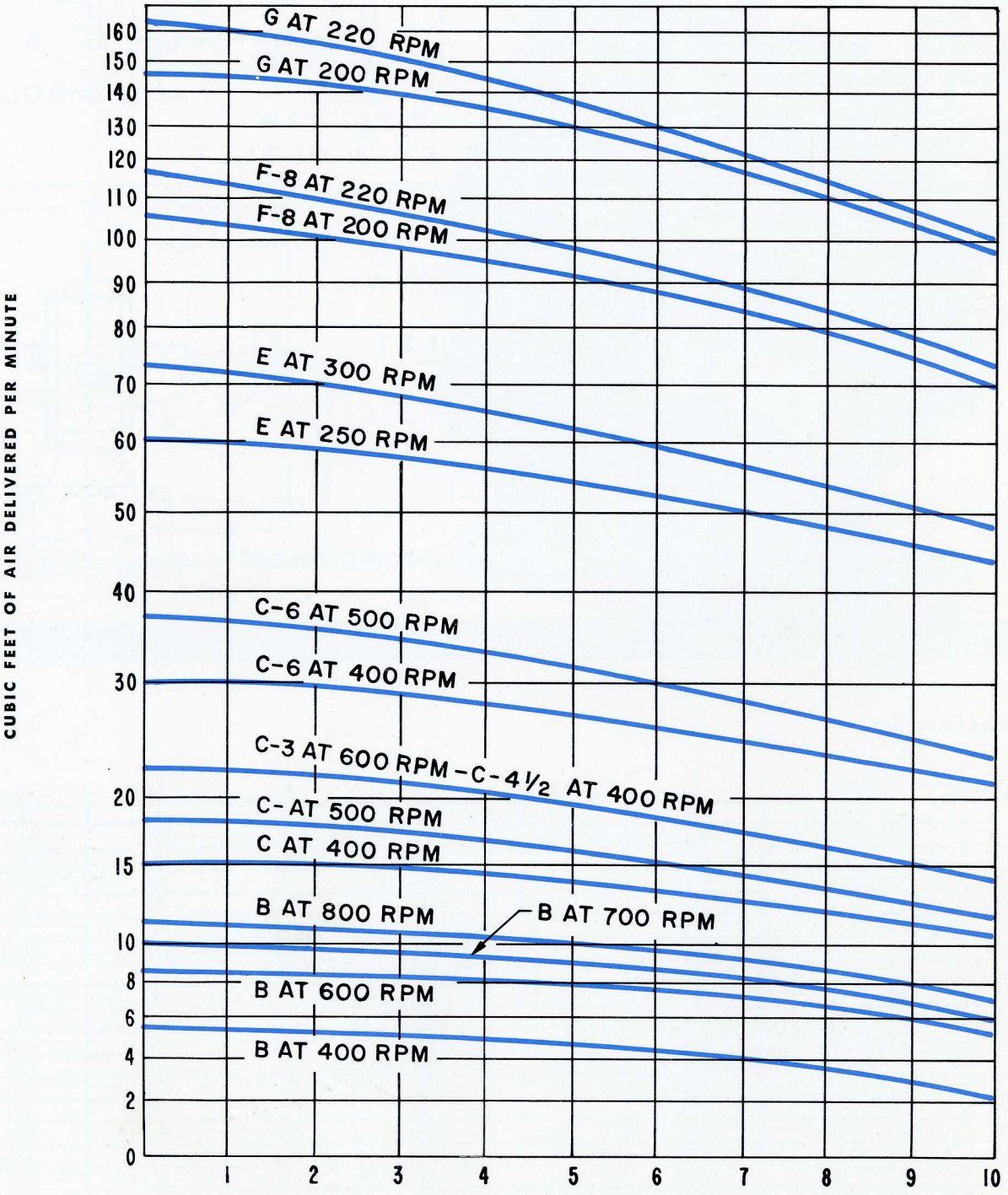
dimensions in inches

Dim. Letter	B	C	C-3	C-6	E	F-8	G
A	6	6 3/8	7 3/8	8 3/4	13	16 1/4	18 1/4
B	1 7/8	2 3/4	2 7/8	7 5/8	11 1/8	13 1/2	14 1/2
C	10 3/4	12 1/4	10 1/8	13 1/8	16 1/2	28 3/8	29 3/4
D	4	4 21/32	5 1/16	6 21/32	8 5/16	9 7/8	11
E	5	5 1/4	5 3/4	7	10 1/2	14	16
F				5 1/4	9 1/2	10 1/4	11
G	7 1/4	7 3/4	6 25/32	8 3/16	11 1/8	17 1/2	18 1/8
J	3/4	1	1	1 1/2	1 1/2	2	2 1/2
K	2	3	3	6	6	8	8
N	3 3/4	3 1/4	3 1/4	3 1/4	5 3/4	5 5/8	5 3/4
O	7 3/32	8 1/2	9 1/16	10 7/8	14 1/8	17	19 3/8
P	6 13/16	8 1/16	8 15/16	9 1/8	13 5/8	16 15/16	19 3/4
R	7 1/4	7 3/4	6 25/32	5 9/16	6 3/8	12 3/8	12 5/8
U	1 1/16	1 3/16	1	1	1 1/4	1 9/16	1 9/16
W	3 7/8	4 1/2	4 9/16	4 11/16	7 3/8	9 1/16	10 5/8
X	1 1/4	1 19/32	1 15/16	1 15/16	2 9/16	4	4 1/2
Y	3 19/32	4 1/8	6 1/2	8 1/16	7 1/4	8 1/2	9 1/2
Keyway	Flat	3/16	1/4	1/4	1/4	3/8	3/8
Bolts	3/8	1/2	1/2	3/8	1/2	1/2	1/2
Type Brg.	C or S	C	R	R	R	S	S

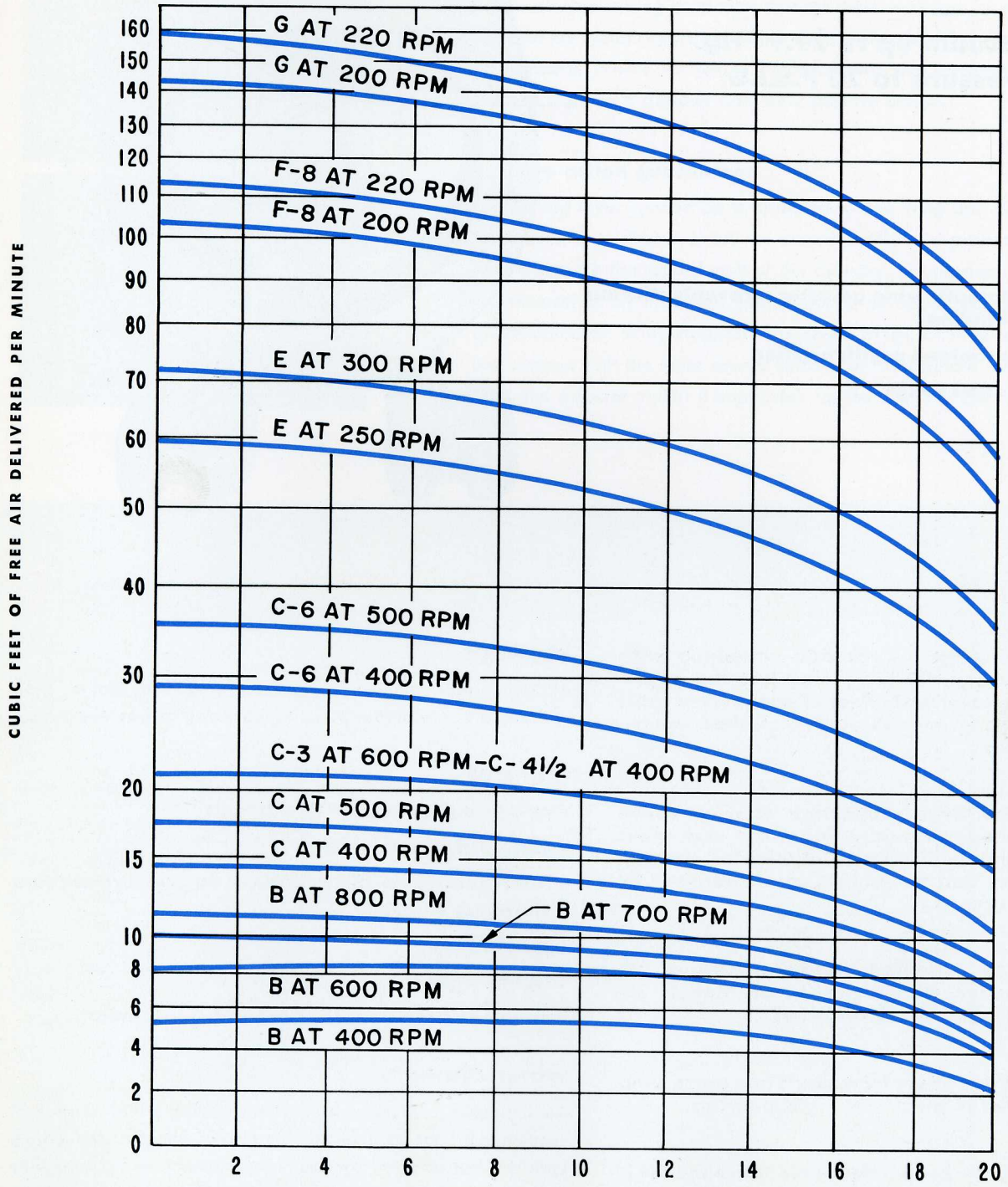
NOTE: C = Cast-Iron Felt Packed Bearing
S = Stuffing Box Type
R = Roller Bearing Type

(continued)

4-wing type pumps (continue

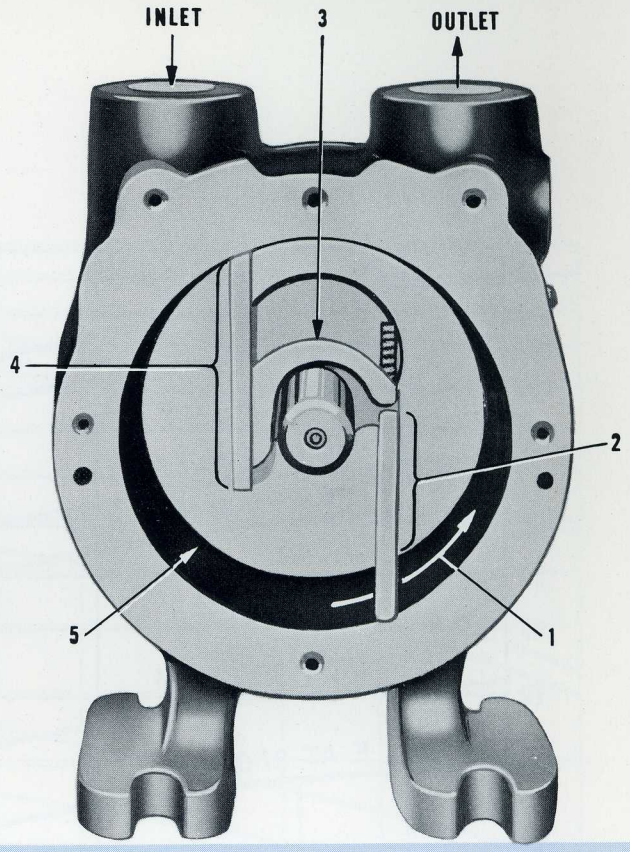


sizes B to G


G AT 220 RPM
G AT 200 RPM
F-8 AT 220 RPM
F-8 AT 200 RPM
E AT 300 RPM
E AT 250 RPM
C-6 AT 500 RPM
C-6 AT 400 RPM
C-3 AT 600 RPM-C-4 1/2 AT 400 RPM
C AT 500 RPM
C AT 400 RPM
B AT 800 RPM
B AT 700 RPM
B AT 600 RPM
B AT 400 RPM
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
15
10
8
6
4
2
0
2
4
6
8
10
12
14
16
18
20
CUBIC FEET OF FREE AIR DELIVERED PER MINUTE
VACUUM IN INCHES OF MERCURY (Hg)
(referred to 30" atmospheric pressure)

2-wing type pumps

- **vacuum up to 29.9″ Hg.**
- **pressure to 20 P.S.I.G.**



- **automatic wing adjuster (prevents sticking or binding)**
- **guaranteed positive action**
- **all steel wings**

1 **Direction of rotation combined with firm, extra long wing bearing in piston slot and offset of wings from shaft center means easy, noiseless operation.**

2 **The large proportion of wing which always remains in piston slot gives firm bearing and eliminates chattering and fluctuation of air delivery or vacuum.**

3 **The Patented Automatic Wing Adjuster. (Not furnished on Models 26-1½, 26-3, K2 and K4.)**

4 **Wing offset from shaft has extra long slot in piston for rigid bearing.**

5 **Large proportional air space makes it possible to use a small, compact machine.**

Outlet and inlet threaded for standard iron pipe.

bearings

All 2-wing type pumps have roller bearings with seal on shaft end and are suitable for pumping either air or gas.

features

- **cast iron construction throughout**
- **standard pipe threading**
- **interchangeable (from vacuum to pressure without changing rotation)**
- **quiet**
- **lightweight**
- **smaller piston (more space for displacement)**

water cooled

Air subjected to pressure or the presence of a high degree of vacuum will heat up a pump. The hinged wings of the 4-wing type are not affected by the metal expansion, because they open and close on the hinges with very little action. As an extra precaution against heat, certain pump sizes are built with air cooling fins. Other sizes which operate under the most extreme conditions are equipped with water cooling jackets.

Note: for higher vacuum up to 29.9″ Hg. see page 14

automatic wing adjuster

The 2-wing pump is designed for installations requiring a higher degree of vacuum or pressure, but less cubic foot displacement than the 4-wing type. The extra long wings provide more bearing surface when fitted into the long wing slots. They are rigidly constructed and designed for years of wear. These long **steel** wings seal up the air, preventing its escape through back leakage, insuring positive delivery of air at the outlet regardless of pressure and preventing vibration or variation of air pressure. Where vacuum is used the long seal increases the strength of the vacuum, making a steadier and more positive action.

positive action guaranteed

This curved lever connection is attached to one wing and operates as the piston revolves in the cylinder. It adjusts automatically and pushes the **steel** wings out in contact with the curved wall of the cylinder. In operation the **steel** wings adjust themselves by means of centrifugal force combined with the action of this quiet Automatic Wing Adjuster. The **steel** wings, as they revolve, maintain perfect contact with the inner curved surface of the cylinder. *The use of this unique, patented adjuster makes it impossible for the wings in this pump to stick or bind.*

SPECIFICATIONS

for vacuum to 29.9" Hg. see page 14

size of pump		26-1½		26-3		28-3		29-3		29-6		
C. F. M. displacement		2.4	3.6	4.8	7.2	9.3	12.4	15.3	20.4	25.5	30.6	40.8
speed in r.p.m.		1200	1750	1200	1750	600	800	600	800	500	600	800
inlet & outlet pipe tap		⅜"		½"		¾"		1"		1½"		
weight in lbs.		8		13		38		51		68		
(Hg.) VACUUM HORSE POWER	at 24" inter.	.23	.35	.44	.64	.75	.78	1.15	1.45	1.61	1.94	2.58
	at 24" steady	.25	.35	.44	.64	.75	.78	1.15	1.45	1.61W	1.94W	2.58W
	at 27" inter.	.25	.40	.48	.71	.84	.98	1.25	1.69	1.73	2.07	2.75
	at 27" steady	.25	.40	.48	.71	.84	.98	1.25	1.69	1.73W	2.07W	2.75W
	at 29.9" inter.	SEE PAGE FOURTEEN										
	at 29.9" steady											
(P.S.I.G.) PRESSURE HORSE POWER	at 15 lb. inter.	.29	.46	.55	.88	.93	1.23	1.43	1.90	2.25	2.68	3.57
	at 15 lb. steady	.29	.46	.55	.88	.93	1.43	1.43	1.90	2.25W	2.68W	3.57W
	at 20 lb. inter.	.35	.56	.76	1.08	1.10	1.47	1.71	2.28	2.72	3.27	4.35
	at 20 lb. steady	.35	.56	.76	1.08	1.10	1.47	1.71	2.28	2.72W	3.27W	4.35W

Inter.—Intermittent. Not more than ½ hour at a time.
W—Watercooled when pump only is ordered.

If a base mounted pump with oiling system as per page 15 is ordered pump will be air cooled.

(continued)

2-wing type pumps (continued)

specifications

for vacuum up to 29.9 Hg.
see page 14

size of pump		100				106	
C. F. M. displacement		54	65	75	85	95	105
speed in r.p.m.		30.0	370	425	475	720	800
inlet & outlet pipe tap		1½"				3"	
weight in lbs.		125				313	
(Hg.) VACUUM* HORSE POWER	at 24" inter.	2.7	3.2	3.8	4.5	5.4	6.0
	at 24" steady	See page 14					
	at 27" inter.						
	at 27" steady						
	at 29.9" inter.						
	at 29.9" steady						
(P.S.I.G.) PRESSURE HORSE POWER	at 15 lb. inter.	3.4	4.0	4.8	5.7	6.7	7.5
	at 15 lb. steady	3.4	4.0	4.8	5.7	6.7	7.5
	at 20 lb. inter.	4.7	5.2	6.4	7.5	7.5	10.0
	at 20 lb. steady						

Inter.—Intermittent. Not more than ½ hour at a time.
W—Water cooled when pump only is ordered.

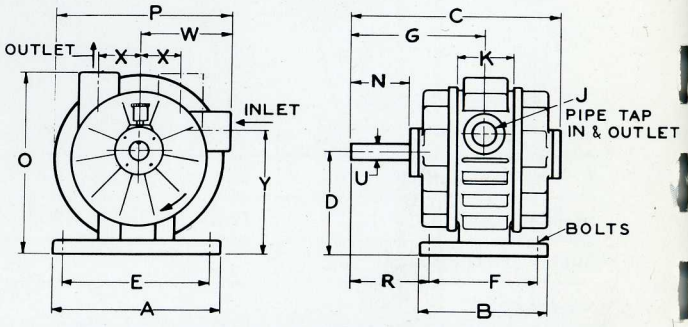
*If a base mounted pump with oiling system as per page 14 is ordered pump will be air cooled.

dimensions

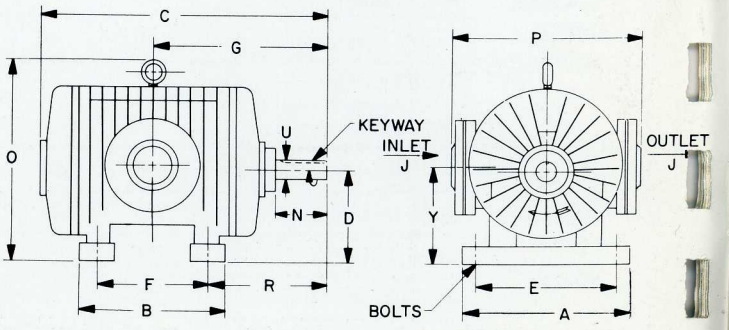
DIM. LETTER	AIR COOLED							WATER COOLED
	26-1½	26-3	28-3	29-3	29-6	100	106	29-6
A	3¼	3¼	6¾	7⅞	7⅞	13	13	7⅞
B	2¾	4⅜	5⅜	6¼	6¼	11⅛	11½	6¼
C	5 7/16	6 15/16	9¼	11 3/16	14 9/16	16½	22⅝	14 9/16
D	2¾	2¾	4 17/32	5 13/32	5 13/32	7 15/16	7½	6 13/32
E	2 3/16	2 3/16	5 11/16	6⅞	6⅞	10½	11	6⅞
F	2⅛	3¾	4 5/16	5¼	5¼	9½	8¾	5¼
G	3 7/16	4 3/16	6	7⅜	9¼	11⅛	13 13/16	9¼
J	⅜	½	¾	1	1½	1½	3	1
K	1½	3	3	3	6	6	12	6
N	1½	1½	2¾	3	3⅜	5¾	4	3⅜
O	4 13/16	5 1/16	7 11/16	9½	9⅝	14⅛	16	10⅞
P	3⅝	3⅝	7 1/16	9 3/16	9 3/16	13⅝	15⅛	9½
R	2⅜	2 5/16	3⅞	4¾	6⅝	6⅜	9 11/32	6 9/16
U	½	½	¾	1	1	1¼	1½	1
W			3 9/16	4⅝	4¾	7⅜		5
X	15/16	15/16	1⅝	1 15/16	1 15/16	2 9/16		2 3/16
Y			5¾	6 13/16	6 13/16	7¼	7⅝	8 1/16
Keyway	Flat	Flat	3/16	¼	¼	¼	⅜	¼
Bolts	¼	¼	⅜	⅜	⅜	½	⅝	⅜
Type Brg.	B	B	R	R	R	R	R	R

NOTE:
R = Roller Bearing Type
B = Ball Bearings

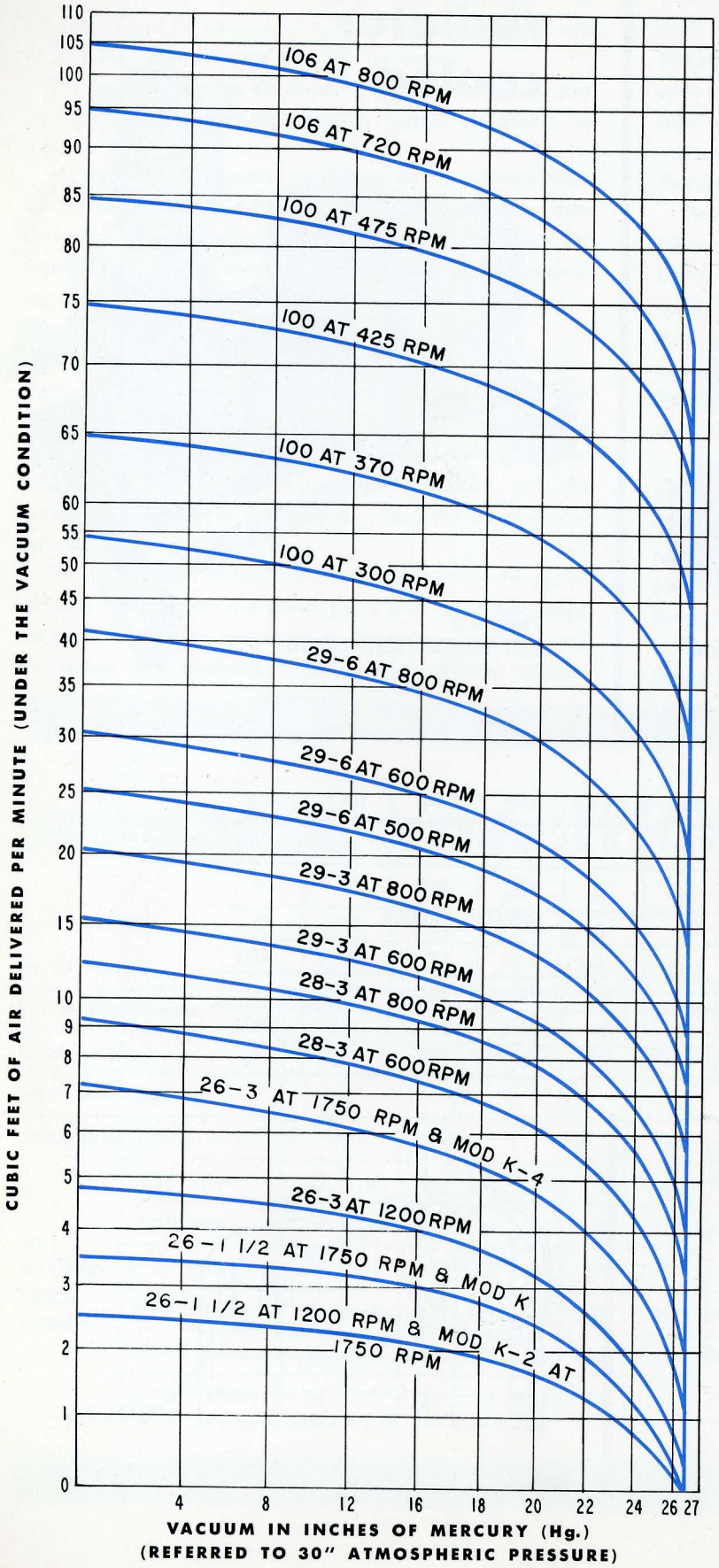
size 26-1½ to 29-6 and 100 pumps



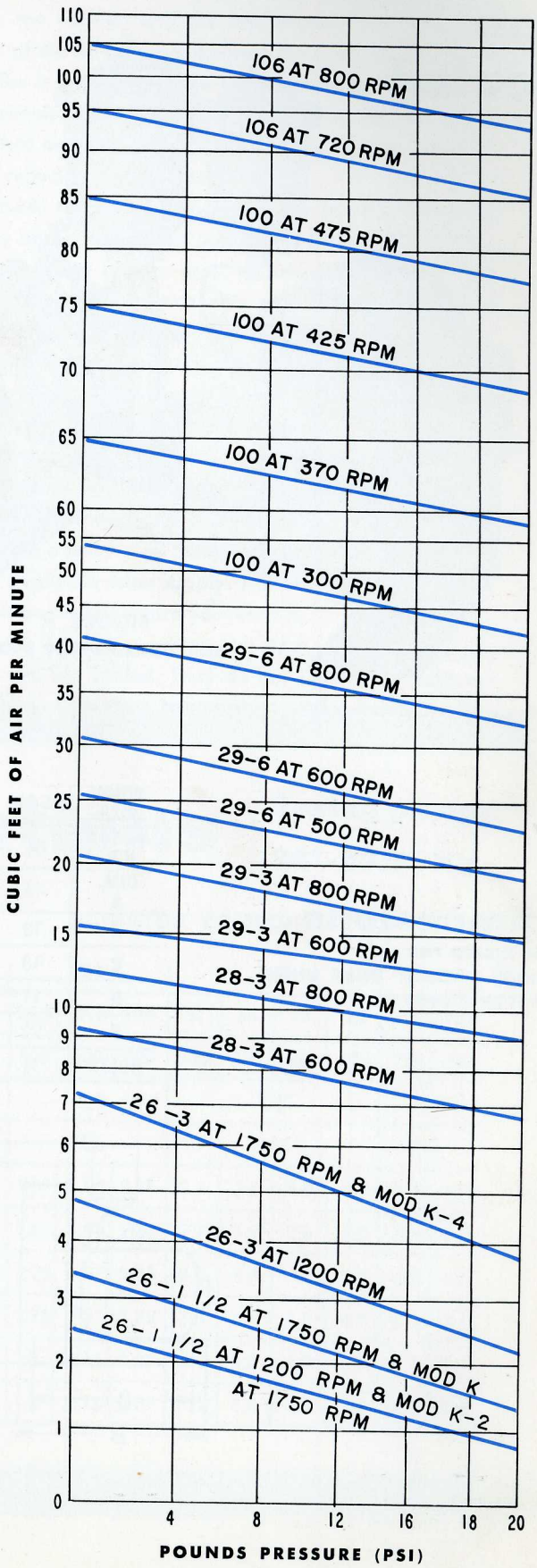
size 106 pump



CFM vs. VACUUM



CFM vs. PRESSURE



high vacuum pumps

fan cooled

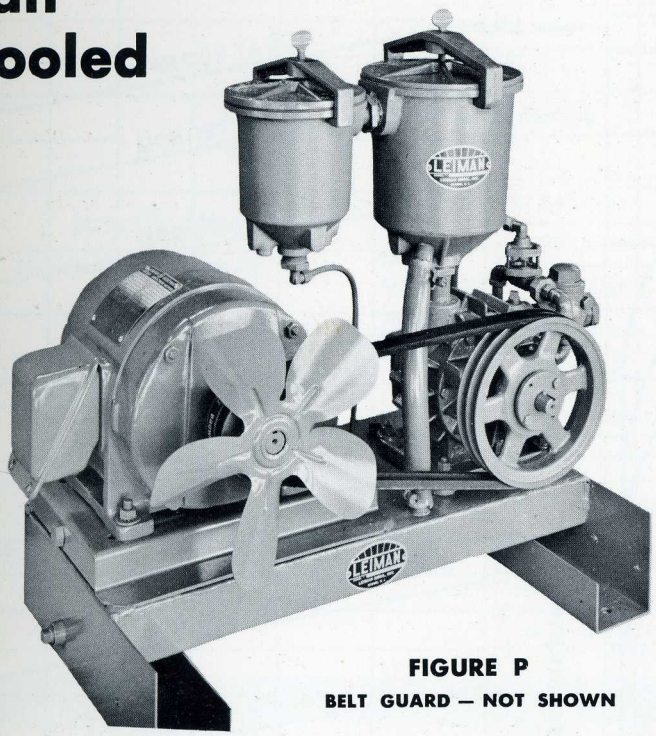


FIGURE P
BELT GUARD — NOT SHOWN

radiator cooled

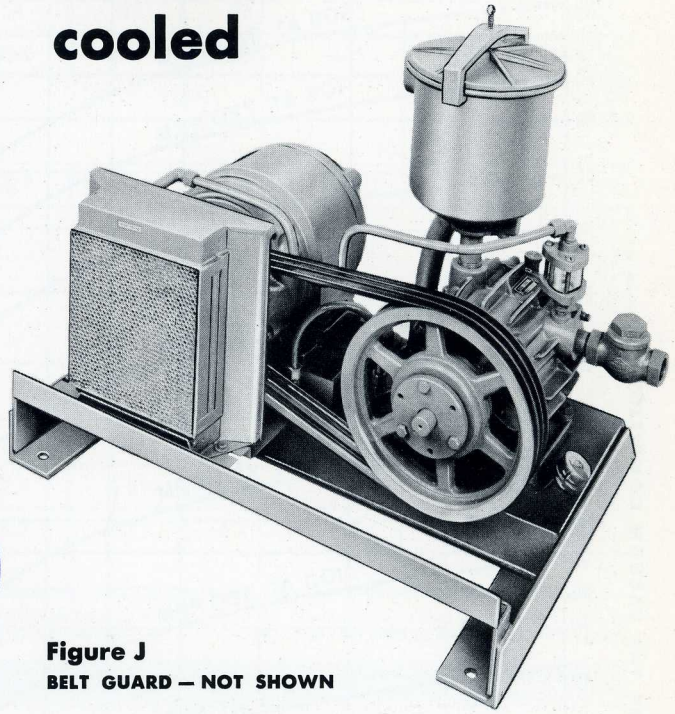
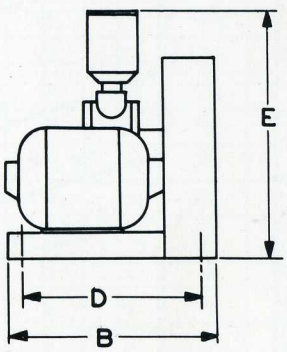


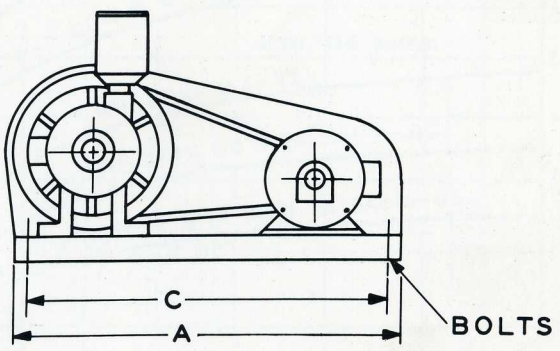
Figure J
BELT GUARD — NOT SHOWN

dimensions

IN INCHES FOR "HIGH VACUUM" PUMP UNITS MOTOR DRIVEN

PUMP SIZE	26-1½	26-3	28-3	29-3	29-6	100	106
MOTOR H.P.	½	¾	1	2	3	5	7½
DIM. A	16	16	23	30¼	30¼	39	47
B	13	13	13	20½	20½	26½	26
C	13	13	20	27¼	27¼	36	41¾
D	11	11	11	18½	18½	24½	24
E	22	22	26	30½	30½	38½	36¼
BOLTS	⅜	⅜	⅜	½	½	½	⅝





These pumps are all of the straight steel wing type — all air cooled and for continuous duty with a maximum vacuum of 29.9 Hg. when referred to a 30" barometer.

The two largest sizes (29.3 and 29.6) as per figure J are equipped with a radiator cooling system described as follows:

The feature of this system is the use of *air-cooled* pumps for *continuous* duty (24 hours a day) while producing vacuums of 29.9" Hg. when referred to a 30" barometer (or within 1/10" of the barometer). Under these rugged operating conditions, the Leiman *air-cooled* pump remains *cool* — average temperature 140° F.

The low operating temperature is maintained by introducing to the pump a continuous and generous flow of precooled lubricating oil of standard S.A.E. 30 viscosity. The oil before entering the pump is circulated through a fan cooled radiator for cooling purposes, and then into the pump and returned to the radiator where the oil temperature is again reduced.

The introduction of cool oil into the interior of the pump reduces the heat on the pump parts and therefore keeps all parts uniform in temperature, prevents excessive metal expansion and eliminates the possibility of the vacuum pump overheating and jamming.

The low operating temperature combined with the radiator cooled oil serves many purposes. The oil provides a seal for the vacuum and the low temperature keeps the viscosity of the oil at a point where the best possible lubricating film is maintained. The lower operating temperature also prevents carbonization of the lubricating oil, which means that one filling of oil will last for a long duration, thereby reducing maintenance time.

The lower temperature increases the pump's volumetric efficiency and allows use of pump speeds up to 800 R.P.M., thereby enabling Leiman Bros. to provide greater air capacity with a pump considerably reduced in physical size over conventional pumps. In effect, you receive more for your money by reducing the cost of the initial investment. Another very important point is that due to the oil being cool, *the vapor problem* has been eliminated.

Now here is the big news — ***watercooling has been eliminated*** — no more water pipes — no more wasteful use of water — no more possibility of the water pipes leaking and creating a mess — no more necessity to place the pump unit near available water supply. The new Leiman *air-cooled* pump can be placed where *you* want it.

The three smaller sizes (26-1½, 26-3 and 28-3) as per figure P, are fan cooled. They do not require the radiator system. Their operating temperature under constant duty averages only 140° F.

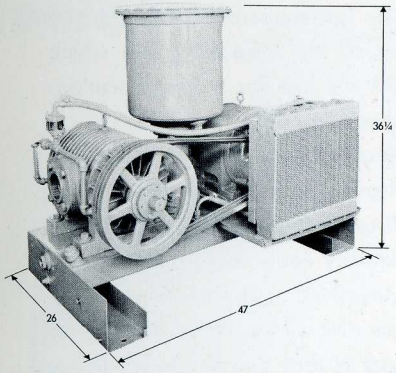
specifications

2-wing pumps
24"-29.9" Hg.

		FAN COOLED								RADIATOR COOLED									
size of pump		**26-1½**		**26-3**		**28-3**		**29-3**		**29-6**			**100**				**106**	
C. F. M. displacement		2.4	3.6	4.8	7.2	9.3	12.4	15.3	20.4	25.5	30.6	40.8	54	65	75	85	95	105
speed in r.p.m.		1200	1750	1200	1750	600	800	600	800	500	600	800	300	370	425	475	720	800
inlet & outlet pipe tap		⅜"		½"		¾"		1"		1½"			1½"				3"	
weight in lbs. (includ. motor)		70		83		183		295		305			490				858	
(Hg.) VACUUM HORSE POWER	at 24" inter.	.23	.35	.44	.64	.75	.78	1.15	1.45	1.61	1.94	2.58	2.7	3.2	3.8	4.5	5.4	6.0
	at 24" steady	.29	.35	.44	.64	.75	.78	1.15	1.45	1.61	1.94	2.58	2.7	3.2	3.8	4.5	5.4	6.0
	at 27" inter.	.25	.40	.48	.71	.84	.98	1.25	1.69	1.73	2.07	2.75	3.0	3.4	4.0	4.9	6.0	6.7
	at 27" steady	.25	.40	.48	.71	.84	.98	1.25	1.69	1.73	2.07	2.75	3.0	3.4	4.0	4.9	6.0	6.7
	at 29.9" inter.	.26	.42	.52	.75	.88	1.15	1.30	1.77	1.8	2.15	2.87	3.4	3.8	4.5	5.5	6.7	7.5
	at 29.9" steady	.26	.42	.52	.75	.88	1.15	1.30	1.77	1.8	2.15	2.87	3.4	3.8	4.5	5.5	6.7	7.5

(continued)

model 106 pump



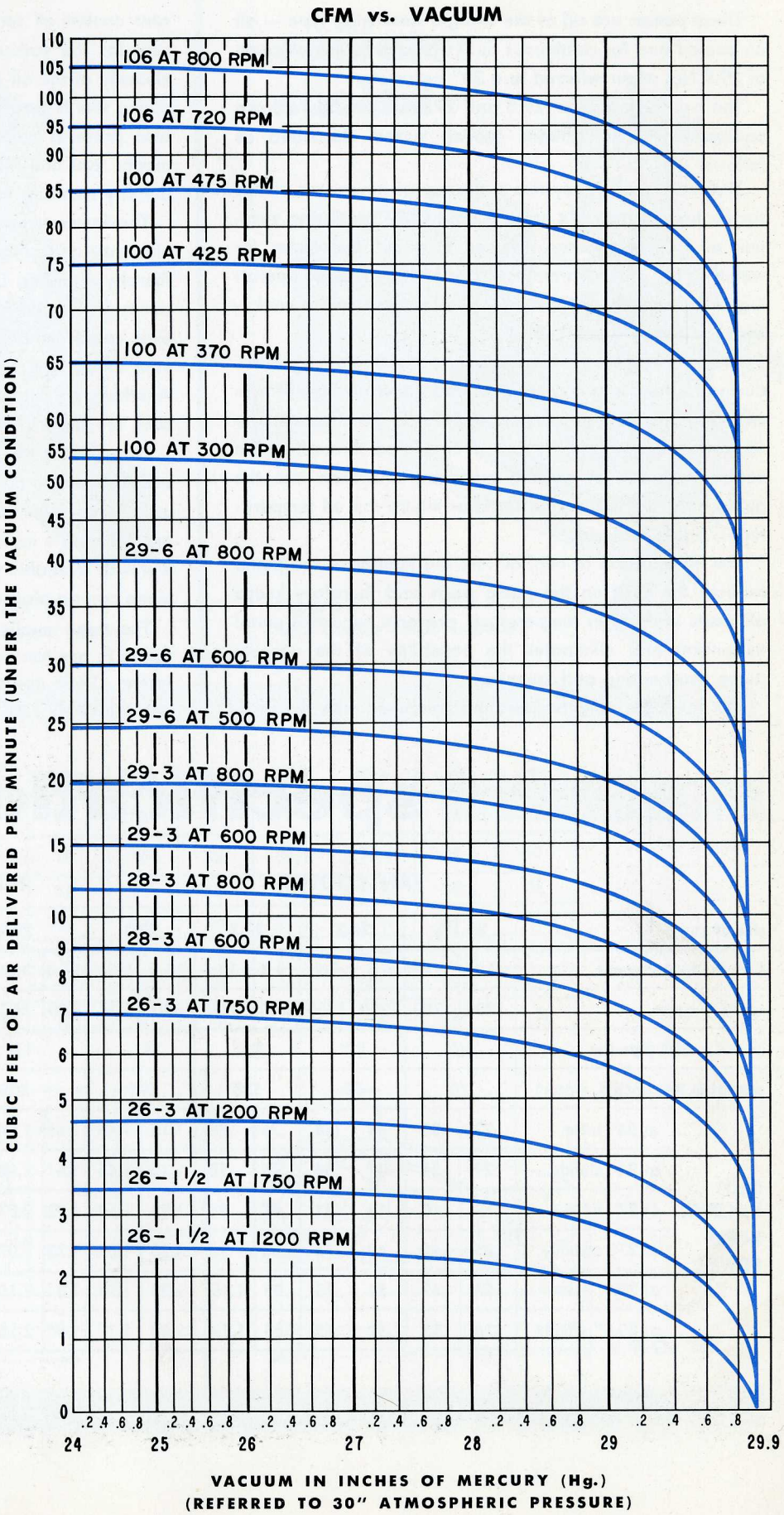
The six dual vane Leiman Pump offers two advantages over most pumps of equal capacity.

First, the six vanes evenly spaced around a balanced rotor divide the pulsations resulting from the compression of air to higher pressure into many small pulsations of less magnitude. This results in not only a more even flow of air but also in less vibration, and eliminates the need for excessively substantial foundations.

Second, greater efficiency is obtained with the dual vane. Since each vane is composed of two independent sections, there are always two contact surfaces on the cylinder, sealing off the low and high pressure side of the pump.

features

- **Anti-friction bearings**
- **Clockwise rotation**
- **1½″ shaft diameter**
- **29.9″ Hg. vacuum**
- **Air-cooled pump for continuous duty**
- **Large air capacity — 50 to 105 CFM**
- **Low operating temperature — 200°F.**
- **No oil vapor**
- **Requires minimum of floor space**
- **One filling of lubricating oil lasts a long time**
- **No watercooling required**



automatically controlled pumps

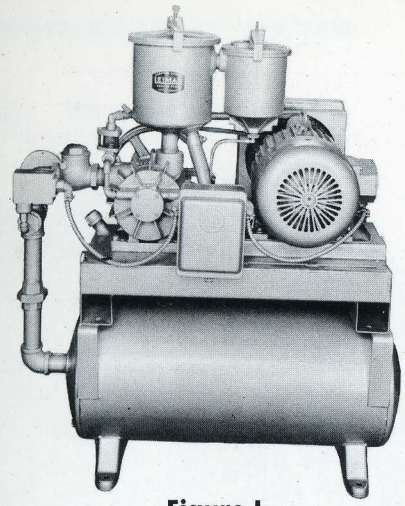
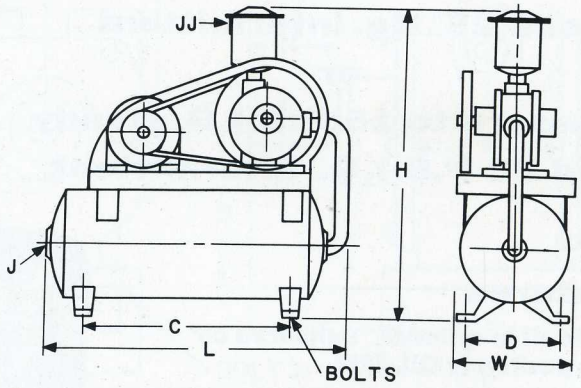


Figure L

Automatically controlled vacuum or pressure tank unit.

for instantaneous vacuum or pressure

These units employ the use of a reservoir tank in conjunction with an automatic on and off switch. By using a check valve between the tank and pump vacuum or pressure may be stored in the tank, available for instant use.



dimensions

vacuum

size of pump	B		C		C-3	C-6		E		F-8		G		26-1½		26-3		28-3		29-3		29-6		100			106		
cu. ft. minute	8.5	10	15	18	22	30	37	61	73	105	115	147	162	2.4	3.6	4.8	7.2	9.3	12.4	15.3	20.4	30.6	40.8	54	65	75	85	95	105
vacuum inches	20	20	20	20	20	20	20	20	20	20	20	20	20	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29
horse power	.56	.66	.90	1.20	1.44	1.80	2.25	3.6	4.3	7.3	8.0	8.2	9.0	.26	.42	.52	.75	.88	1.15	1.30	1.77	2.15	2.87	3.4	3.8	4.5	5.0	6.7	7.5

pressure

size of pump	B		C		C-3	C-6		E		F-8		G		26-1½		26-3		28-3		29-3		29-6		100			106		
cu. ft. minute	8.5	10	15	18	22	30	37	61	73	105	115	147	162	2.4	3.6	4.8	7.2	9.3	12.4	15.3	20.4	30.6	40.8	54	65	75	85	95	105
pressure, lbs.	10	10	10	10	10	10	10	10	10	10	10	10	10	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
horse power	.65	.75	1.0	1.4	1.6	2.0	2.5	3.6	4.3	7.3	8.0	8.2	9.0	.35	.56	.76	1.08	1.10	1.47	1.71	2.28	3.27	4.35	4.7	5.2	6.4	7.5	7.5	10.0

overall dimensions in inches

size of tank	12 x 30	12 x 30	12 x 30	16 x 36	18 x 40	24 x 60	24 x 60	10 x 20	12 x 30	12 x 30	12 x 30	16 x 36	18 x 60	24 x 60
H	32	36	36	43.5	53	70.5	73	37	37	40	49.5	49.5	53	65
W	15	18	18	22	27	32	33	14.5	14.5	14.5	22	22	27	26
L	40	40	40	45	46	80	78	36.5	36.5	36.5	45	45	66	80
C	25	25	25	31	28	54	54	16.50	25	25	25	31	48	54
D	12.75	12.75	12.75	14	13.43	18.25	18.25	8.12	12.75	12.75	12.75	14	13.43	18.25
J	.75	1	1	1.50	1.50	2	2.50	.37	.50	.75	1	1.50	1.50	3
JJ	.75	1	1	1.50	1.50	2	2.50	.50	.50	.50	1	1.25	1.50	3
bolts	½	½	½	½	½	½	½	⅜	½	½	½	½	½	½
gallons	14.6	14.6	14.6	31.3	44.0	117.5	117.5	6.8	14.6	14.6	14.6	31.3	66.0	117.5

rotary oil-less pumps

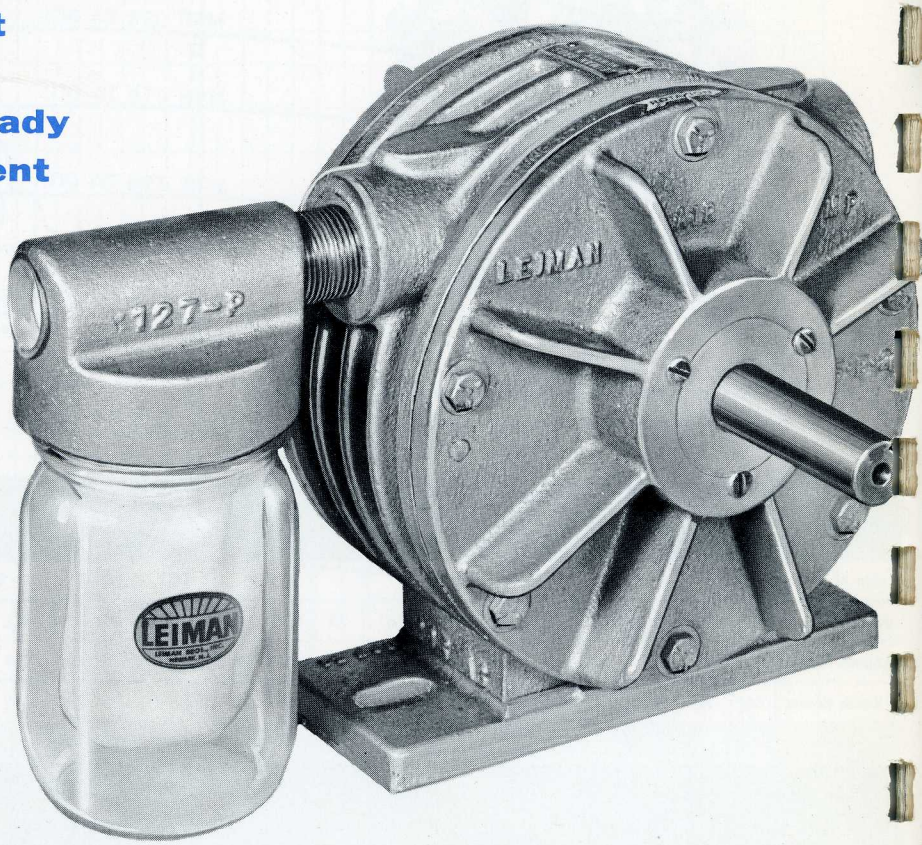
capacities of 1 to 48 CFM

•

vacuum to 22″ Hg. steady and 25″ Hg. intermittent

or

pressure to 15 P.S.I.G. steady and 20 P.S.I.G. intermittent



features

- **No oil in cylinder. Delivered air is positively OIL-FREE**
- **Sealed bearings spaced from cylinder**
- **Four vanes take up own wear**
- **Low cost**
- **Vacuum and pressure remain constant**
- **Cylinder and rotor are cast iron, vanes are carbon impregnated with bronze**

typical applications

- **Food handling equipment**
- **Paper feeding and paper folding**
- **Textile industry**
- **Instrument controls**

general information . . .

These new rotary positive non-lubricated vacuum and pressure pumps are equipped with sealed bearings, therefore cylinder is absolutely void of any lubrication.

The air coming from the exhaust is free of contamination and can be applied on a great many applications where lubricated pump cannot be used.

Four free sliding vanes are used and slots and cylinder are honed to a glassy smooth surface having an extremely low coefficient of friction. The vanes take up their own wear and pumps are most compact in design.

Some typical needs would be food handling equipment, paper manufacturing, textiles, pumping oxygen, etc.

They deliver from 1 CFM up to 48 CFM. Vacuum up to 22″ Hg. steady and 25″ Hg. intermittent or 15 P.S.I.G. steady and 20 P.S.I.G. intermittent pressure. Really quiet when running.

	SINGLE CYLINDER					DOUBLE CYLINDER					
						295-2x2		295-2x3		295-3x3	
size of pump	202-1½	206-3	295-2	295-3	297-6	Narrow Pump	Wide Pump	Narrow Pump	Wide Pump	Narrow Pump	Wide Pump
C. F. M. displacement	3	6	13	17.5	48	13	13	13	17.5	17.5	17.5
speed in r.p.m.	1725	1725	1725	1725	1400	1725		1725		1725	
inlet & outlet pipe tap	⅜″	½″	¾″	¾″	1″	¾″		¾″		¾″	
weight in lbs.	8	9	30	40	70	60		58		85	

For higher capacity (C.F.M.) write to factory.

See Performance Curves on Pages 20-21

dimensions in inches

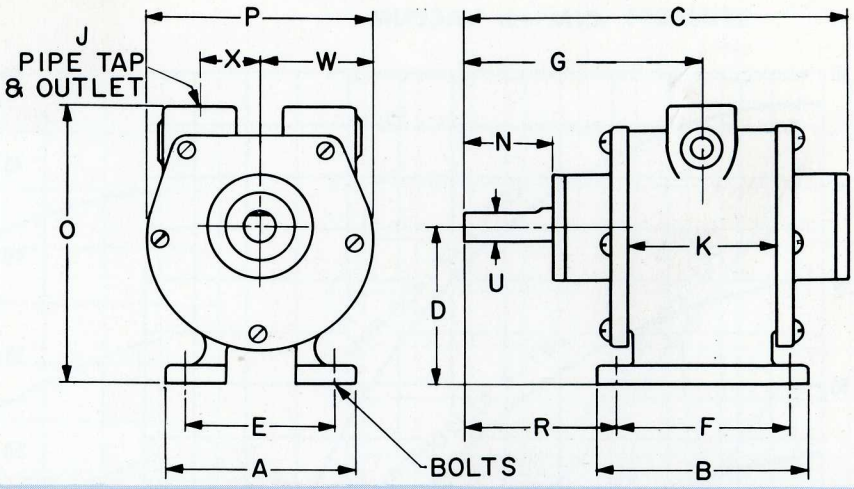
Dim. Letter	202	206	295-2	295-3
A	3 1/4	3 1/4	7	7
B	2 3/4	4 3/8	2 5/8	2 5/8
C	5 7/8	7 3/8	7 5/16	8 5/16
D	2 3/4	2 3/4	4 1/2	4 1/2
E	2 3/16	2 3/16	5	5
F	2	3 3/4		
G	3 3/8	3 11/32	4 29/32	5 13/32
J	3/8	1/2	3/4	3/4
K	1 1/2	3	2	3
L				
N	1 1/2	1 1/2	2 1/2	2 1/2
O	4 13/16	5 1/16	7 11/16	7 11/16
P*	3 5/8	3 5/8	7	7
R			4 29/32	5 13/32
U	1/2	1/2	3/4	3/4
W	1 13/16	1 13/16		
X	15/16	15/16		
Y			6 1/8	6 1/8
Keyway	Flat	Flat	3/16	3/16
Bolts	1/4	1/4	3/8	3/8
Type Bearings	B	B	B	B

NOTE: B = Ball Bearings
* = Does not include inlet filter

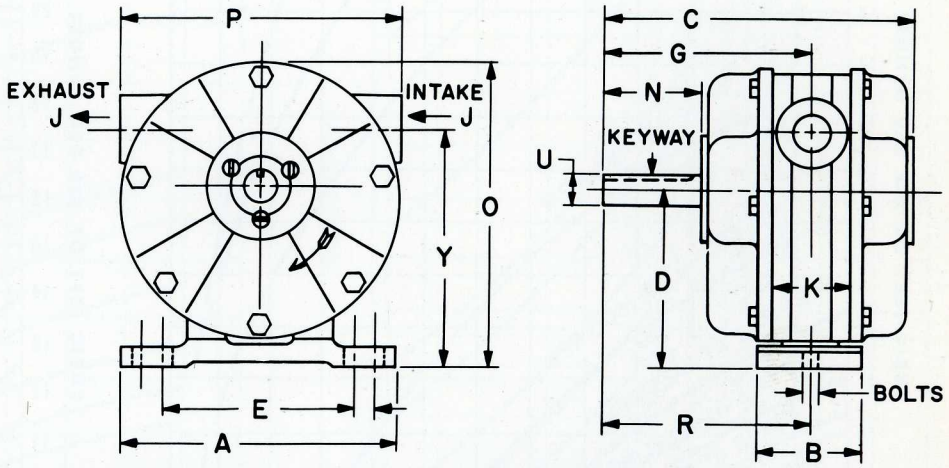
Dim. Letter	297-6	295 2x2	295 2x3	295 3x3
A	7 7/8	7	7	7
B	6 1/4	5	5	5
C	14 1/32	9 11/16	10 11/16	11 11/16
D	5 7/32	4 1/2	4 1/2	4 1/2
E	6 13/16	5	5	5
F	5 1/4	3 3/4	3 3/4	3 3/4
G	8 21/32	5 9/32	4 29/32	5 25/32
J	1	3/4	3/4	3/4
K	6	2 & 2	2 & 3	3 & 3
L		2 3/8	2 7/8	3 3/8
N	3 9/32	2 1/2	2 1/2	2 1/2
O	9 3/8	7 11/16	7 11/16	7 11/16
P*		7	7	7
R	6 1/32	4 7/32	4 23/32	5 7/32
U	1	3/4	3/4	3/4
W	4 1/2			
X	2 3/16			
Y	7 1/16	6 1/8	6 1/8	6 1/8
Keyway	1/4	3/16	3/16	3/16
Bolts	1/2	3/8	3/8	3/8
Type Bearings	B	B	B	B

NOTE: B = Ball Bearings
* = Does not include inlet filter

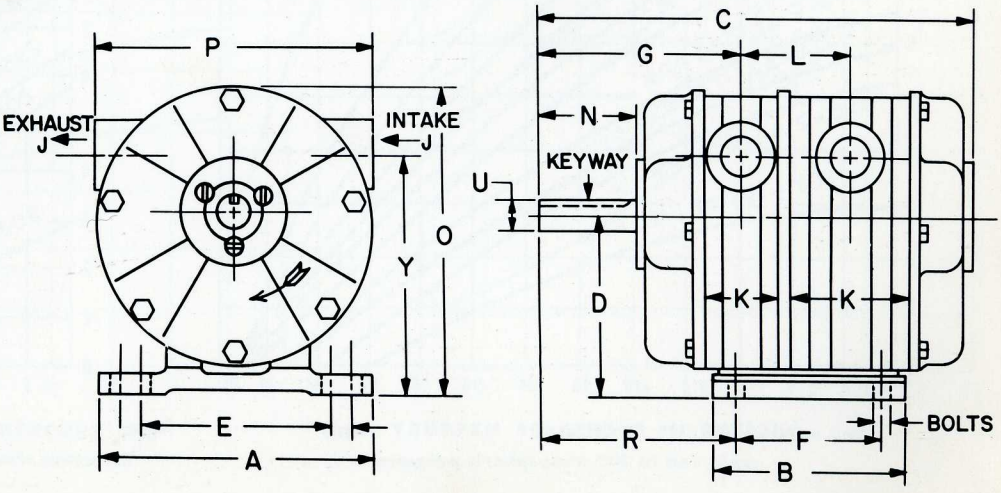
models 202, 206 and 297-6



model 295 single cylinder



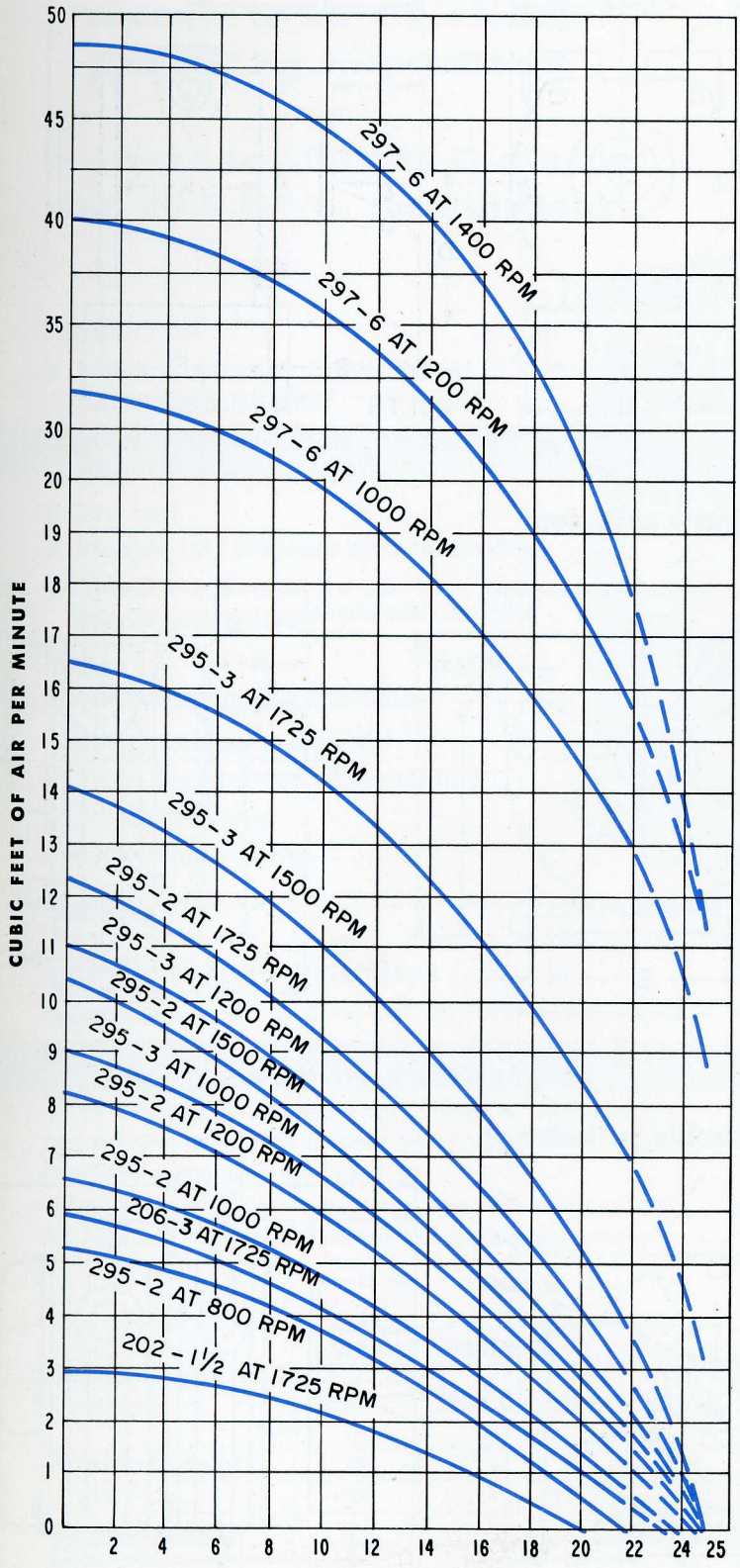
model 295 double cylinder



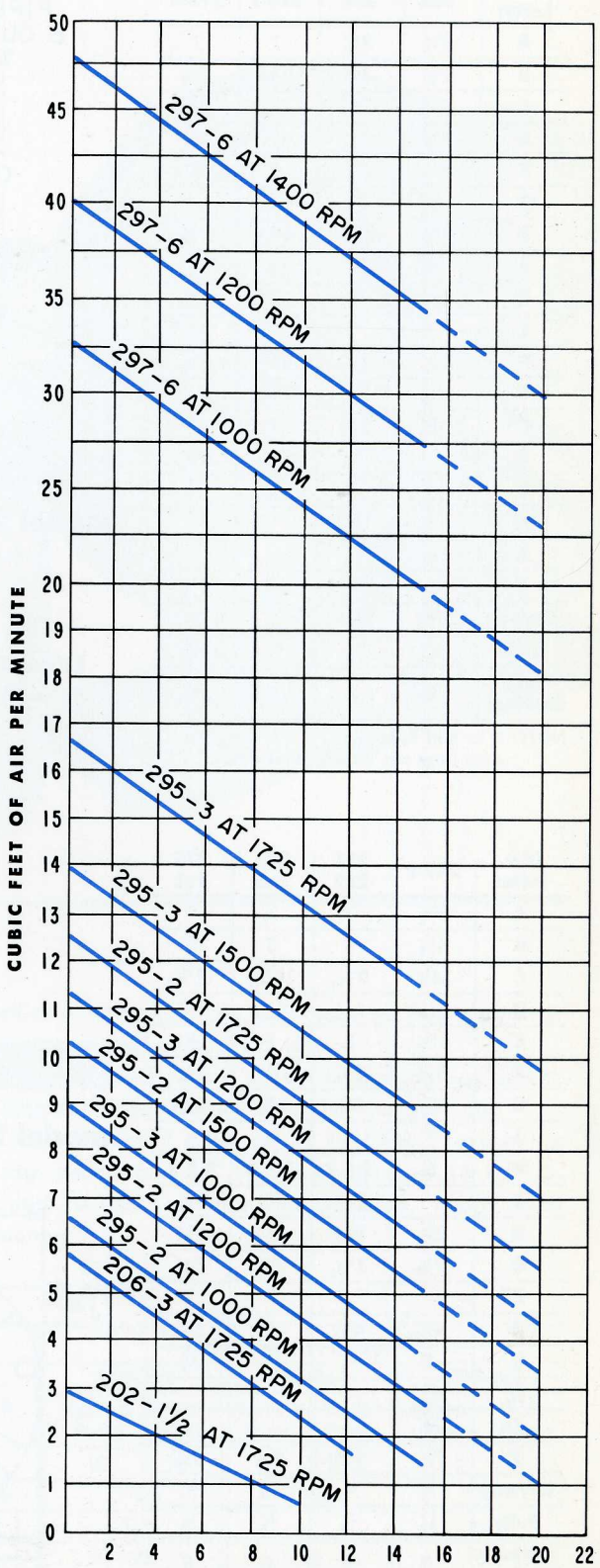
(continued)

performance curves for oil-less pumps

CFM vs. VACUUM



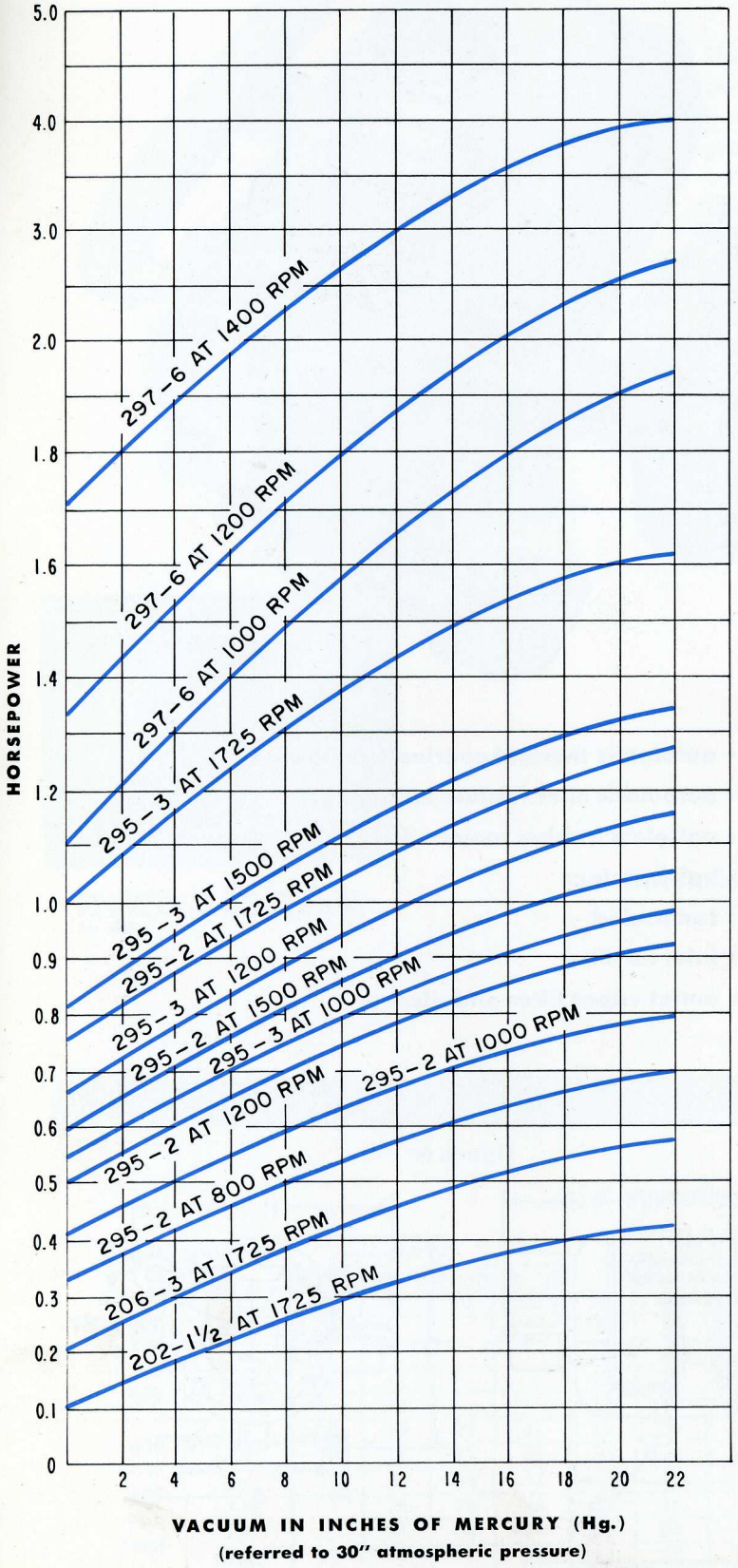
CFM vs. PRESSURE



– – – – – – – Denotes intermittent service only

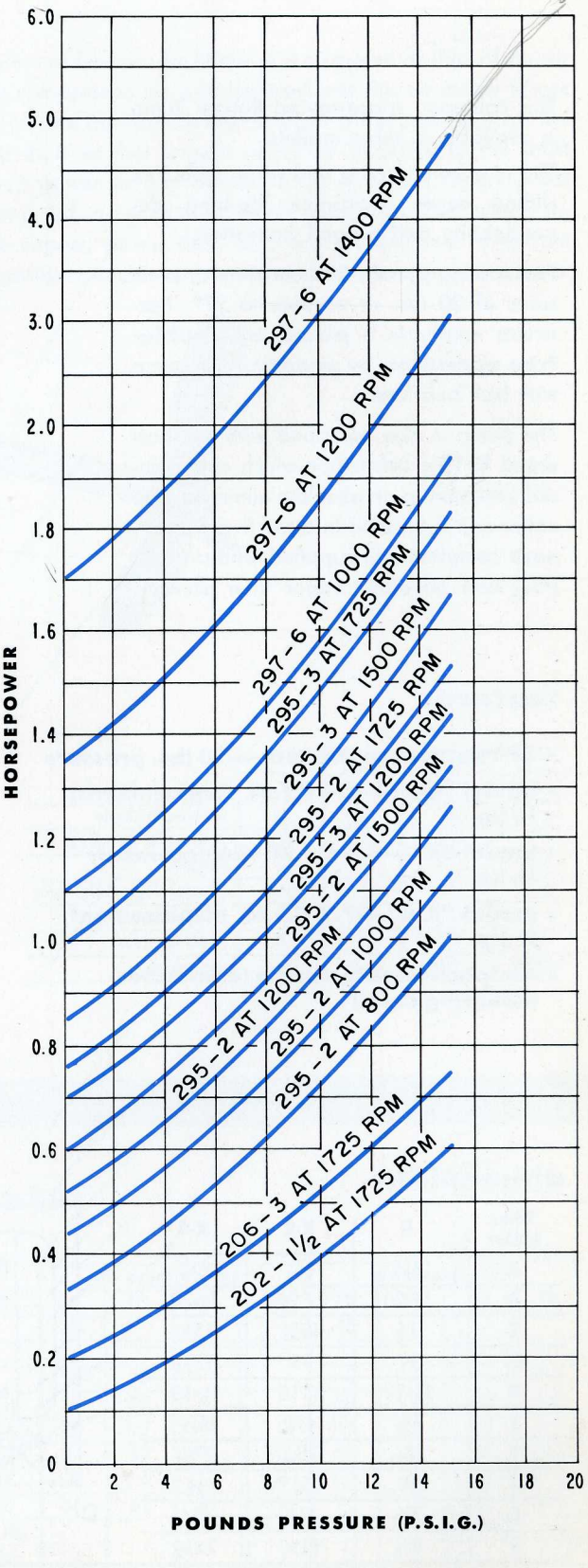
All performance curves for oil-less pumps are subject to approximately 10% variation.

H.P. vs. VACUUM



VACUUM IN INCHES OF MERCURY (Hg.)
(referred to 30" atmospheric pressure)

H.P. vs. PRESSURE

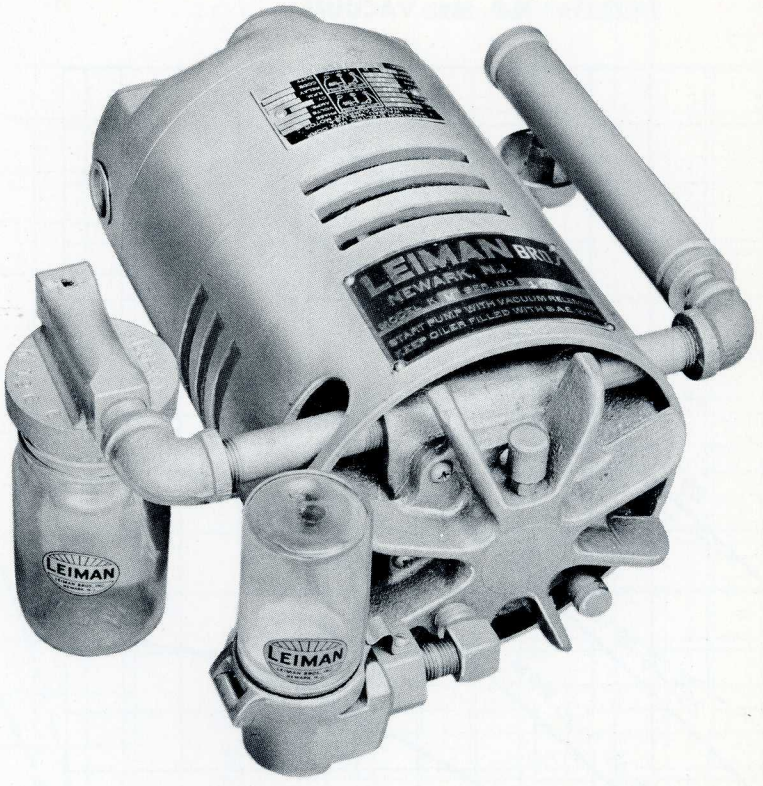


POUNDS PRESSURE (P.S.I.G.)

All performance curves for oil-less pumps are subject to approximately 10% variation.

integral air and vacuum pumps

for vacuum and pressure



This compact, space-saving Rotary Pump is available in three models.

The cast iron housing and rotor, with free sliding vanes guarantee life-long dependability and rugged operation.

Fan cooling permits 24 hour duty at pressures of 20 lbs. or vacuum to 27". Particular emphasis is placed on **trouble-free operation** by equipping the pump with ball bearings.

The pump is also equipped with our patented E113-4 Lubricator which cuts manual attention to an absolute minimum. The entire unit is finished in attractive enamel, each complete unit supplied with an inlet filter and an outlet vapor filter silencer.

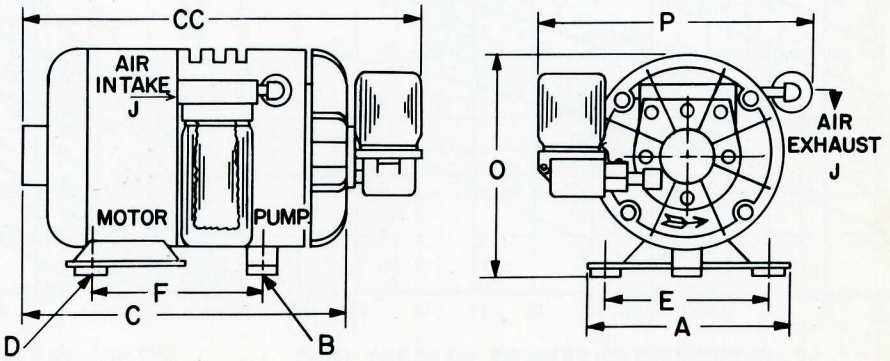
features

- **27" vacuum continuous—20 lbs. pressure**
- **model "K-2"—2.4 C.F.M. displacement; ¼ hp**
- **model "K"—3.6 C.F.M. displacement; ⅓ hp**
- **model "K-4"—7.2 C.F.M. displacement; ½ hp**
- **compact—space saving (eliminates mounting costs)**
- **automatic thermal overload protection**
- **automatic oiler (visible oil supply)**
- **noiseless (rubber mounted)**
- **ball bearings**
- **fan cooled**
- **inlet air-filter**
- **outlet vapor filter and silencer**

dimensions

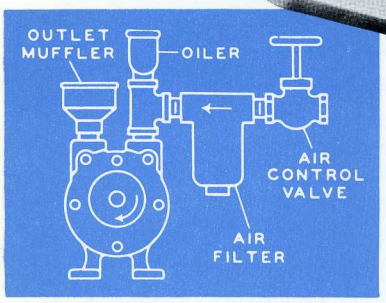
Dim. Letter	K	K-2	K-4
A	6½	6½	6½
B	¼-20	¼-20	¼-20
C	15	12⅝	15⁷⁄₁₆
CC	17	15	17½
D	⅝-18	⅝-18	⅝-18
E	4⅞	4⅞	4⅞
F	8²¹⁄₃₂	7¹¹⁄₁₆	7²⁹⁄₃₂
J	⅜	¼	½
O	7⅝₃₂	7¼	8¾
P	8⅝	11½	12½

Figure N



air motors *for use with inflammable vapors, gases, dust, etc.*

The operation of Leiman Air Motor is the reverse of that of an air pump. The compressed air is introduced into the air motor where it acts as pressure against the four straight wings and revolves the piston and shaft so that a gear or pulley attached to the shaft will transmit power to any device to be operated. Spark-proof and splash-proof, a Leiman Air Motor should be used where inflammable vapors, gases, dust, etc., are present and where the use of a gasoline engine or electric motor would be dangerous.



Note: Paddle, air filter and air control valve are not furnished with the Air Motor.

dimensions

	reversible		not reversible	
size of air motor	**24-1½**	**24-3**	**B**	**C-3**
shaft diameter	½	½	11/16	1
cylinder diameter	3½	3½	5¾	7
height	5	5	7⅛	9 1/16
over all length (shaft)	6⅛	7⅛	11	10⅛
pipe connection	⅜	½	¾	1
weight (lbs.)	8	13	27	45
bearings	ball	ball	cast iron	roller

air motor data

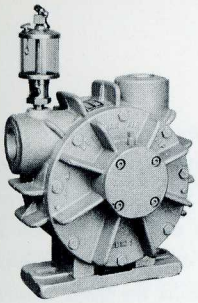
size of air motor		24-1½				24-3				B				C-3			
r.p.m.		air pressure, lbs.				air pressure, lbs.				air pressure, lbs.				air pressure, lbs.			
		20	40	60	80	20	40	60	80	20	40	60	80	20	40	60	80
200	h.p.	.03				.06				.30				.75			
	c.f.m.	5				10				26				52			
400	h.p.	.06	.12			.12	.24			.50	.90			1.2	1.9	2.5	3.0
	c.f.m.	6	15			12	30			30	50			60	100	140	180
600	h.p.	.08	.18	.29	.37	.16	.36	.58	.74	.70	1.2	1.6	2.0	1.4	2.1	2.8	3.5
	c.f.m.	10	17	25	32	20	34	50	64	34	56	73	90	68	112	160	208
800	h.p.	.11	.23	.36	.47	.22	.46	.72	.94	.98	1.6	2.2	2.8	1.7	2.5	3.5	4.5
	c.f.m.	11	18	26	33	22	36	52	66	38	62	81	100	76	124	180	236
1800	h.p.	.15	.41	.68	.94	.30	.82	1.36	1.88								
	c.f.m.	12	21	27	35	24	42	54	66								

c.f.m. is cubic feet of free air per minute consumed by air motor.

22 23 24 25 26 28

gas boosters and accessories

Figure A
Bare gas pump with oil cup.



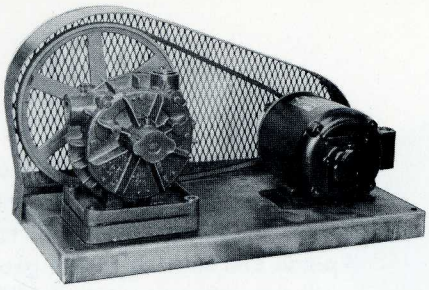


Figure R
Bare gas pump unit with motor drive.

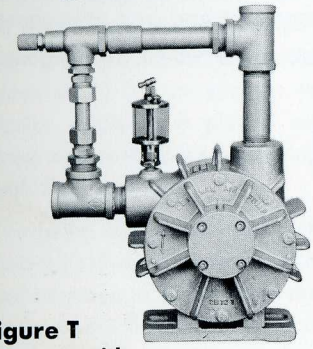


Figure T
Gas pump with valve and by-pass.

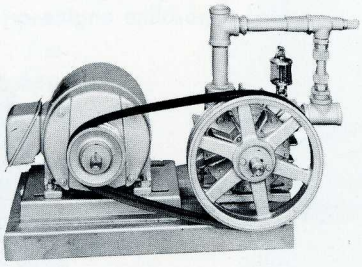


Figure M
Motor-driven gas pump unit with valve and by-pass.

The Leiman Gas Pump was developed for pumping city gas, natural gas, and other non-corrosive gases. Where the normal pressure of city gas is too low for use in manufacturing operations a Leiman Gas Pump will produce a smooth, steady, and constant pressure at the outlet regardless of any variations in the entering pressure.

In the natural gas industry Leiman Air Pumps are used to force the gas into the pipe lines. Very often a non-producing well has been brought back through the use of a Leiman Gas Pump to create a suction which starts the gas flowing again.

Where a manufacturing operation requires the gas to be mixed with air for use in blow torches, gas furnaces, etc., the solution is a Leiman unit consisting of a gas pump and an air pump to furnish the air.

Bearings are equipped with air-tight shaft seal.

accessories

Valve Gas By-Pass

For maintaining non-varying pressures. Valve is extremely sensitive to pressure variations, however small. By-pass piping handles all the unused gas and returns it to the inlet side of the pump.

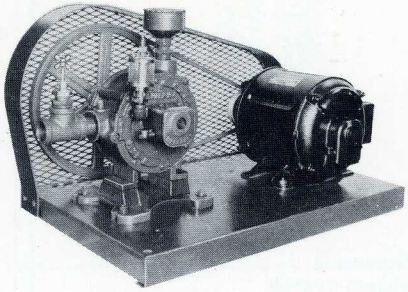
dimensions

	size of gas booster		26-1½	B	C-3	C-6	E	F-8	G
	cu. ft. per minute displacement		2.4	8.5	22	30	61	105	147
	speed (r.p.m.)		1200	600	600	400	250	200	200
	inlet and outlet size		⅜"	¾"	1"	1½"	1½"	2"	2½"
	h.p. at 1 pound pressure		1/10	¼	½	¾	1	2	2.5
	*h.p. at 5 pounds pressure		1/6	½	1	1½	2	5	5.6
figure No.	requisite air pump	size	B	E	F-8	G			
		c.f.m.	8.5	61	105	146			
		inlet and outlet	¾"	1½"	2"	2½"			
A	bare gas pump with	weight, lbs.	8	27	40	67	148	288	303
	oil cups only	floor space	3¼x8"	7½x11"	8¼x14"	14x9"	12x24"	17x28"	20x30"
T	gas pump with	weight, lbs.	56	75	95	120	200	341	350
	valve and by-pass	floor space		13x20"	16x20"	15x23"	24x21"	28x25"	30x25"
D	bare gas pump unit	weight, lbs.	70	100	125				
	with motor drive	floor space	8½x15"	13x26"	17x27"	30x17"	28x39"	32x42"	32x65"
M	gas pump with	weight, lbs.		148	175				
	valve and motor drive	floor space		13x29"	17x30"	41x17"	28x42"	32x45"	32x65"

***for higher pressure (up to 20 lbs.) write to factory.**

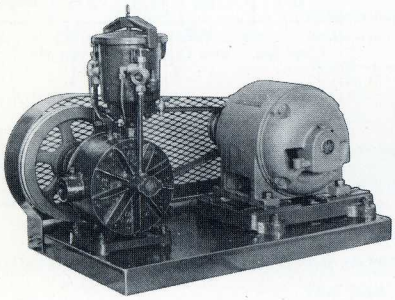
All Leiman Air Pumps may be supplied as a complete motor-driven unit. Equipped with motor (electric or gasoline), V-belt drive, pulleys, base plate, and belt guard, these units are individually designed for specific jobs. Standard equipment includes oil cup, pressure or vacuum relief valve, and appropriate muffler. Water cooled air pumps supplied in certain sizes for steady service.

Figure D



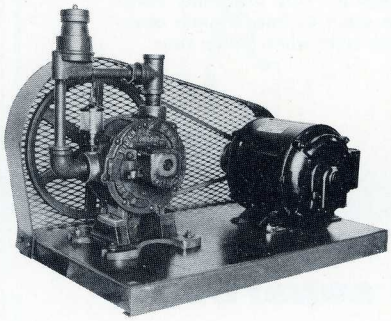
VACUUM UNIT with Oiler.

Figure E



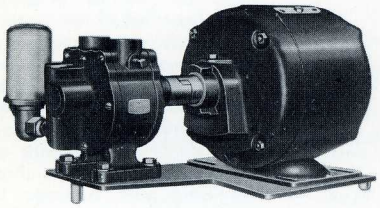
MOTOR-DRIVEN UNIT with Automatic Oiling System.

Figure F



PRESSURE UNIT up to 20 lbs. is equipped with oil cup, oil return muffler, and pressure relief valve.

Figure G

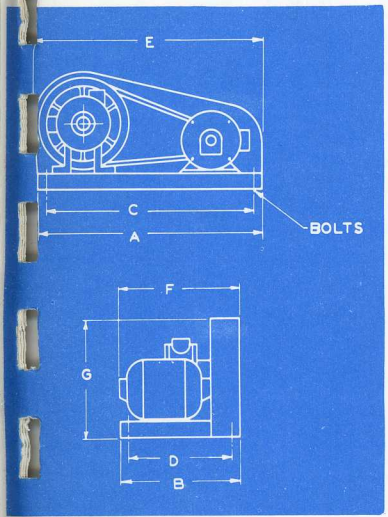


DIRECT COUPLED UNIT. Sizes 26-1½ and 26-3 only.

dimensions in inches

size of pump	26-1½	26-3
length	15	20
width	8	10
height	9	10

dimensions in inches



pump size →	26-1½	B C 28-3 26-3	B C C-3 C-6 26-3 28-3 29-3 29-6	C C-6 28-3 29-3 29-6	29-6	E	E	E	F-8 G	F-8 G	F-8 G	106
motor h.p. →	¼ to ½	¼ to ¾	1 to 1½	2 to 3	5	2	3	5	3	5	7½ to 10	7½
A	16	20	27	30	34	34	36	38	38	41	59	47
B	11	10	13	21	26	26	24	26½	26½	30	32	26
C	15	19	26	26¾	31	31	33	36	36	39	56	41¾
D	7¼	9	12	19	24½	24½	22	24¾	24¾	28	30	24
E	16	23½	31	30½	34	34	38	46	38	41	60	47
F	12	13	17	21	26	25	26	26	26	28½	28	26
G	8	14½	16⅝	17	16½	20	21	22	25	30	34	24
bolts	⅜	⅜	⅜	⅜	½	½	½	½	½	½	½	⅝

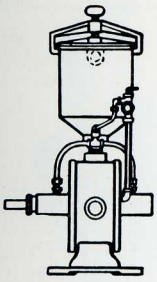


Figure 2
OILING SYSTEM
This system feeds oil to interior and bearings. It is designed for 4-wing type pumps which operate at 0-20 inches of vacuum. System operates only when pump runs.

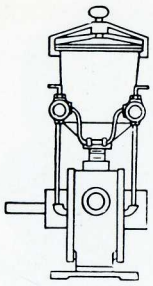
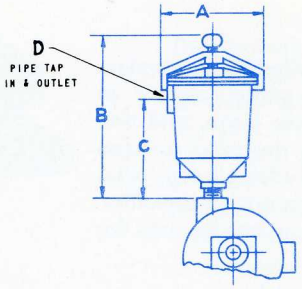


Figure 3
OILING SYSTEM
Feeds oil to pump interior only and is used on 29-6 2-wing pump for 21" to 28" vacuum. Has adjusting valve on each oil-line. System operates only when pump runs.



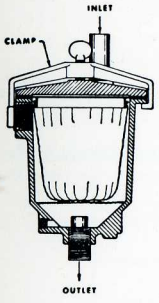
DIMENSIONS IN INCHES OF OILING SYSTEMS, FILTERS (4) AND SEPARATORS (5)

pump size	dimensions in inches A	B	C	D
26-1½	5 5/16	9	5¾	⅜
26-3	6⅞	9⅝	6	½
B 28-3	6 15/16	9½	6	¾
C C-3 29-3	8 7/16	12¼	7⅞	1
C-6 29-6	9½	13⅜	8⅞	1½
E	13	18¾	10¾	1½
F-8	13	18	12¾	2
G	17 5/16	19½	15⅜	2½

Note — These dimensions also apply to Inlet Filter No. 4 and Outlet Separator No. 5.

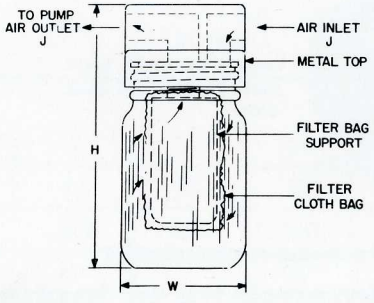
oil filters and separators

Figure 4 — INLET FILTER



For use on the inlet or vacuum side of Leiman Air Pumps to clean the air before it enters the pump. Air or gas passing through the removable cloth bag deposits dirt and grit and prevents wear on the precision fitted parts and prolongs the life of the pump. ½", ¾", 1", 1¼", 1½", 2", 2½" pipe sizes.

Figure 4A — INLET DUST FILTER

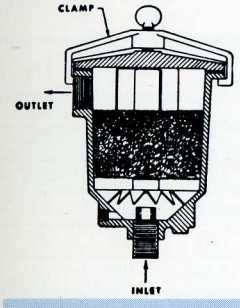


Cleans air before entering pump. Dust laden air enters inlet (which is on a tangent) and whirls around in glass jar with a cyclonic action. Most dust is thrown to bottom of jar while the rest is deposited on outside of filter cloth bag as the air filters through. Prevents wear and damage to precision parts of pump. ½" and ¾" pipe sizes.

dimensions in inches

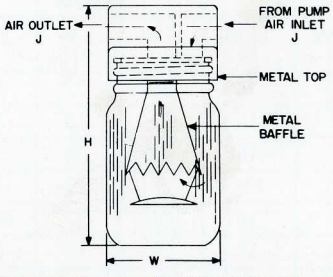
J	⅜	½ OR ¾	¾
W	3	3 3/16	4
H	5¼	6⅝	8
size of jar	8 oz.	Pint	Quart

Figure 5 — OUTLET SEPARATOR



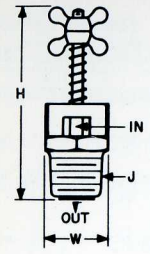
Replaceable filter material absorbs oil vapor from the pressure or outlet side of a Leiman Air Pump and prevents it from blowing into the working area. The large size of the separator does not reduce the flow of air or the pressure. ½", ¾", 1", 1¼", 1½", 2", 2½" pipe sizes.

Figure 6 — OUTLET SEPARATOR



Separates oil from the air as it passes through. Oil collects in bottom of clear glass jar where it can be seen. Glass jar good for 5 P.S.I. Over 5 P.S.I. metal container must be used. ½" and ¾" pipe sizes.

Figure 7 — VACUUM RELIEF VALVE

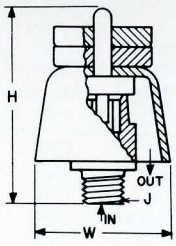


An adjustable safety valve for vacuum up to 27 inches. 3/8", 3/4", 1 1/4" pipe sizes.

dimensions in inches

J	H	W
3/8	3	15/16
3/4	4	1 1/2
1 1/4	5 3/8	2 1/8

Figure 8 — PRESSURE RELIEF VALVE

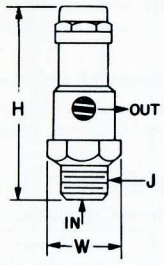


A weighted safety valve for pressure up to 5 pounds. 1/2", 1", 1 1/4", 1 1/2" pipe sizes.

dimensions in inches

J	H	W
1/2	4 3/8	3
1	6	3
1 1/4	6 5/8	3 3/4
1 1/2	6 5/8	3 3/4

Figure 8A — PRESSURE RELIEF VALVE

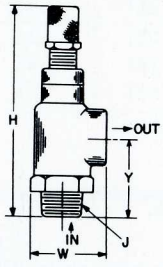


An adjustable safety valve for pressure up to 20 lbs. 3/8", 1/2", and 1" pipe sizes.

dimensions in inches

J	H	W
3/8	3 3/8	1 1/4
1/2	3 3/8	1 1/4
1	5 3/4	2

Figure 10 — BY-PASS PRESSURE RELIEF VALVE USED ON GAS BOOSTER

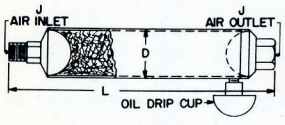


Sensitive valve for close regulation of gas up to 25 pounds. 1/2", 3/4" pipe sizes. Note: for larger valves write to factory.

dimensions in ins.

J	H	W	Y
1/2	5 5/8	1 27/32	2 3/8
3/4	5 3/16	1 7/8	1 15/16

Figure 11 — STATIC OIL VAPOR FILTER



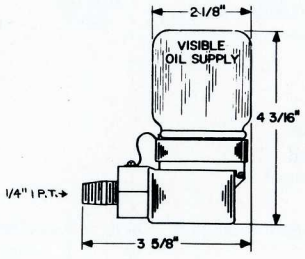
This new type filter operating on an entirely new and different principle has the ability to remove oil vapor from the air which passes through it.

dimensions in inches

	J	D	L	X	Z
K, K-2, 26-1 1/2	1/4	1 1/4	7 1/8	1	2
B, B-3, 26-3, 28-3, K-4, DBL. B-2x2 and 2x3	1/2	2	10 9/16	1	2
29-3, 29-6, C, C-3, C-4 1/2, DBL. C-3x4 1/2, 3x3, 3x6, 4 1/2x6	3/4	3	18 5/16	1	2
C-6				2	

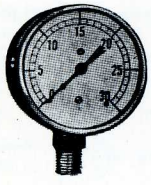
X = Req. for Steady Vacuum.
Z = Req. for Interrupted Vacuum Use.

Figure 12 — AUTOMATIC OILER (E113-4)



Feeds oil from SAE 30 to 50 only when the pump runs. Can be adjusted 1 drop in 5 minutes to 5 drops in 1 minute. No moving parts.

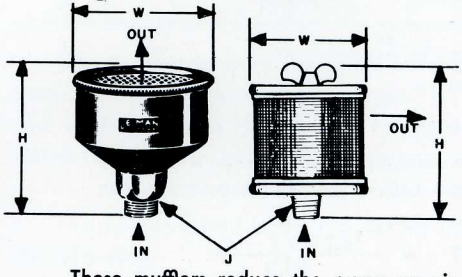
Figure 13 — AIR GAUGE



For indicating vacuum up to 30 inches or pressure to 15 lbs. or 30 lbs. Specify vacuum or pressure when ordering. 1/4" pipe size only.

Application	Range	Dial Size
Vacuum	0-20	2 1/2
Vacuum	0-30	3 1/2
Pressure	0-30	2 1/2

Figure 14 — MUFFLERS



These mufflers reduce the pump or air motor noise and also absorb some oil. They are usually used on vacuum pump outlet, but can be used on pressure pump inlet. Above left, muffler for pipe sizes 3/8", 1/2", 3/4". Above right, muffler for pipe sizes 1", 1 1/4", 1 1/2", 2", 2 1/2"

dimensions in inches

J	H	W
3/8	3	2 11/16
1/2	3	2 11/16
3/4	3 3/4	3 1/8
1	5 7/16	3 5/8
1 1/2	6 1/4	3 5/8
2	7 1/4	4 9/16
2 1/2	7 5/8	5 1/2

ABBREVIATIONS

LFM. – Lineal feet per minute (Velocity)
CFM. – Cubic feet per minute.
FPM. – Feet per minute (Velocity). – LFM.
H.P. – Horse power.
Hg. – Mercury or mercury gauge.
mm. – Millimeter (1/25 inch approx.)
μ – **MICRON** – 1/1000 millimeter = 10^{-3} mm.
P.S.I. – Pounds per square inch.
P.S.I.G. – Pounds per square inch gauge.
P.S.I.A. – Pounds per square inch absolute.
RPM.– Revolutions per minute.
S.A.E. – Society of Automotive Engineers.
Temp. – Temperature.
M^3 – Cubic meter.
CC – Cubic centimeter.

AIR FORMULAE

V – Volume of free air in cu. ft.
V_c – Volume of compressed air in cu. ft.
V_v – Volume of expanded air in cu. ft.
V_T – Volume of tank in cu. ft.
V_P – Pump capacity in cu. ft. per minute
V_R – Cu. ft. per pump rev. (free air)
P – Gauge pressure in lbs. per sq. in.
P_A – Absolute pressure in lbs. per sq. in.
P_T – Final absolute press. in tank. (Inches mercury)
I_M – Inches of mercury, gauge
I_w – Inches of water, gauge
F_w – Feet of water, gauge
F – Linear velocity in ft. per minute
F_s – Linear velocity in ft. per second
a – Area in sq. inches
A – Area in sq. feet
D – Diameter in inches
L – Length in feet
T – Time in minutes
T_A – Absolute Temperature Fahrenheit = 461 + Fahr. Temp.
C – Coefficient of orifice
R – Revolutions of pump
π – 3.1416
B – Barometric press. in inches mercury (Absolute pressure)
t – Temperature Fahrenheit
W – Weight in pounds.
V_{PV} – Pump capacity in cfm. expanded air

FORMULAE

To find the absolute pressure when the gauge pressure or the inches of vacuum are known, the following formula can be used (at sea level):

$$P_A = 14.7 + P = \frac{14.7\,(29.9 - I_M)}{29.9}$$ FORMULA 48-A

To convert inches of mercury to pounds pressure or vice versa:

$$P = \frac{I_M}{2.036} \qquad I_M = 2.036\,P \text{ (at } 32^oF) \qquad \text{FORMULA 49-A}$$

To convert inches of water to pounds pressure or vice versa:

$$P = \frac{F_w}{27.686} \qquad I_w = 27.686\,P \qquad \text{FORMULA 49-B}$$

To convert feet of water to pounds pressure or vice versa:

$$P = \frac{F_w}{2.307} \qquad F_w = 2.307\,P \qquad \text{FORMULA 49-C}$$

To convert feet of water to inches of mercury or vice versa:

$$F_w = \frac{I_M}{.88} \qquad I_M = .88\,F_w \qquad \text{FORMULA 49-D}$$

To find the volume of a given amount of air when it is under pressure (when atmospheric pressure is 14.7 lbs.):

$$V_c = V\frac{14.7}{P_A} = V\,\frac{14.7}{14.7 + P} \qquad \text{FORMULA 49-E}$$

To find the volume of a given amount of air when it is under vacuum (when atmospheric pressure is 14.7 lbs.):

$$V_v = V\,\frac{14.7}{P_A} \qquad \text{FORMULA 49-F}$$

To find the velocity in feet per minute of air flowing through a pipe when the volume is known (friction not considered):

$$F = \frac{576\,V}{\pi\,D^2} \qquad \text{FORMULA 49-G}$$

For Boyle's law the formula is:

$$P_A \times V = \text{constant} \qquad \text{FORMULA 49-H}$$

For Charles' law the formula is:

$$\frac{P_A \times V}{T_A} = \text{constant} \qquad \text{FORMULA 49-I}$$

When the pressure is constant, the volume will vary as the square of the diameter:

$$\frac{V}{V_1} = \frac{D^2}{D_1^2} \qquad \text{FORMULA 50-B}$$

When the volume is constant, the pressure will vary as the fourth power of the diameter:

$$\frac{P}{P_1} = \frac{D^4}{D_1^4} \qquad \text{FORMULA 50-C}$$

The time required to produce a vacuum on a tank is as follows:

$$R = \frac{\log P_A - \log P_T}{\log (V_T + V_R) - \log V_T} \qquad \text{FORMULA 50-D}$$

$$T = \frac{4.6\,V_T}{V_P + V_{PV}}\,\log\frac{B}{P_T} \qquad \text{FORMULA 50-E}$$

The above formulae depend upon using a highly efficient pump.

Time required to produce a given pressure in a tank:

$$T = \frac{V_T\,P}{14.7\,V_P} \qquad \text{FORMULA 50-F}$$

The weight of a cubic foot of dry air:

$$W = \frac{B}{346.5 + .7535\,t} = .0746 \text{ lbs. at } 72^oF. \qquad \text{FORMULA 50-G}$$

When air flows through an orifice and the diameter is constant, the pressure will vary as the square of the volume:

$$\frac{P}{P_1} = \frac{V^2}{V_1^2} \qquad \text{FORMULA 50-A}$$

COMPARISON OF GAUGES USED FOR PRESSURE & VACUUM

ABSOLUTE PRESSURE Inches Mercury	mm. Mercury	Pounds per sq. in.	Mercury Column Inches	Water Column in Feet	Water Column in Inches	Gauge Pressure Pounds	Gauge Pressure Ounces	
0	0	0	29.92					
	1	.02	↑					
.1	2							
	3							
	5	.10						
.2	7							
.3	8	.16						
	10	.19						
.4	12							
.5	13	.25						
	15							
.6	16	.31						
.7	19	.37						
	20							
.8	22	.42	-29. Approx. Barometer Reading					VACUUM
.9	24							
1.	25	.48						
2.04	52	1	-27.87					
4.1	103	2	-25.83					
6.1	155	3	-23.79					
8.2	207	4	-21.75					
10.2	259	5	-19.71					
12.2	310	6	-17.67					
14.3	362	7	-15.63	-17.7	212			
16.3	414	8	-13.59	-15.5	186			
18.4	465	9	-11.55	-13.1	157			
20.4	520	10	- 9.51	-10.8	130			
22.4	570	11	- 7.47	- 8.5	102			
24.5	620	12	- 5.43	- 6.2	74			
26.5	670	13	- 3.39	- 3.9	35			
28.6	720	14	- 1.35	- 1.5	-18.3			
29.92	760	14.7	0	0	0	0	0	Atmospheric Pressure
		14.73	.075		1	.03	.6	
		14.76	.13	.14	1.74	.06	1.	
		14.95	.51	.58	6.9	.25	4.	
		15.1	.88	1.	12	.43	7.	
		15.2	1.02	1.2	13.9	.50	8.	
		15.5	1.53	1.7	20.8	.75	12.	
		15.7	2.	2.3	27.8	1.	16.	
		16.2	3.1	3.5	41.7	1.5	24.	
		16.7	4.1	4.6		2.		
		18.7	8.2	9.2		4.		
		19.7	10.2	11.5		5.		
		20.6	12	13.5		6.		
		21.7	14.3	16.1		7.		
		22.7	16.4	18.4		8.		
		23.7	18.4	20.7		9.		
		24.7	20.4	23		10.		
		26.7	24.5	28		12.		

Varies continually with the atmospheric pressure

PRESSURE

TABLE 68-A

The mercury column and the absolute pressure are dependent upon the atmospheric pressure which changes from time to time.

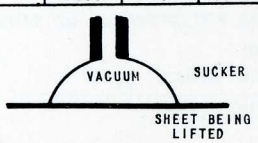
One micron = .001 mm. absolute pressure

29.92" mercury = 14.7 lbs. pressure

HOLDING FORCE CREATED BY VACUUM ON SUCKERS

Vacuum in inches of mercury	Diameter of Sucker 1"	1½"	2"	3"	4"	5"
5	1.9 lbs.	4.4	7.8	17.7	31.4	49
10	3.8	8.7	15.4	34.6	62	96
15	5.8	13.1	23.3	52.2	93	145
20	7.6	17.3	30.8	69	123	192
25	9.6	21.8	38.6	87	154	241 lbs.

TABLE 55-B



BOILING POINTS OF WATER UNDER VACUUM

Absolute Pressure in lbs. per sq. in.	Vacuum in inches of mercury	Boiling Point °F	Absolute Pressure in lbs. per sq. in.	Vacuum in inches of mercury	Boiling Point °F
1.0	27.9	102	5	19.7	162
1.2	27.5	107	6	17.7	170
1.4	27.1	113	7	15.6	177
1.6	26.7	118	8	13.6	183
1.8	26.3	122	9	11.6	188
2.0	25.8	126	10	9.5	193
2.2	25.4	130	11	7.5	198
2.4	25.	133	12	5.4	202
2.6	24.6	136	13	3.4	206
2.8	24.2	139	14	1.3	210
3.	23.8	141	14.7	0	212
4.	21.7	153			

TABLE 55-A

VACUUM REQUIRED TO CAUSE WATER TO FLOW UP INTO A TANK

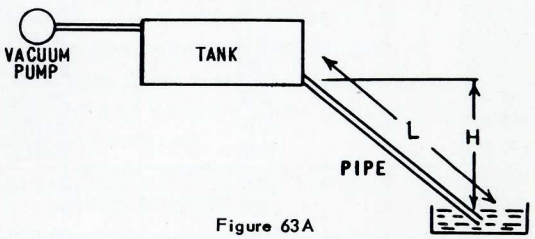


Figure 63A

Gallons per Minute	If H = 9 ft. L = 12½ ft. 3/4	1	1-1/2	2" pipe	If H = 15 ft. L = 25 ft. 3/4	1	1-1/2	2"
5	9.1	8.4			15.5	14.	13.4	13.3
10	12.2	9.3	8.2		21.7	15.8	13.6	13.4
15	17.	10.3	8.4" Vacuum Inches Hg.		18.8	14.	13.5	
20	23.	12.5	8.6	8.2		22.6	14.4	13.7
30		17.	9.3	8.4		–	15.8	14.2
40			10.1	8.8			17.5	14.8
50			11.2	9.1			19.5	15.5

TABLE 63-B

These figures were obtained by taking the vacuum required to lift the water up the height "H" (See table page 66) and adding this to the vacuum required to cause the flow: which figures are given in table on preceding page.

Inches vacuum = .88 × H feet

The time required to draw water up into a tank depends on the following:

Tank size
Hose diameter
Vacuum pump size
Hose length
Height of tank

ATMOSPHERIC PRESSURE AT ALTITUDES ABOVE SEA LEVEL

Altitude in Feet	Absolute Pressure of Atmosphere in lbs. per sq. in.	Mercury Gauge Reading in inches
Sea level	14.7	0
1,000	14.2	1.0
2,000	13.7	2.1
3,000	13.2	3.1
4,000	12.7	4.1
5,000	12.2	5.0
6,000	11.7	6.0
7,000	11.3	6.9
8,000	10.9	7.7
9,000	10.5	8.6
10,000	10.1	9.4
15,000	8.29	13.0
20,000	6.75	16.3
30,000	4.36	21.1
40,000	2.72	24.5
50,000	1.70	26.5
60,000	1.05	27.79
70,000	.65	28.60
80,000	.40	29.10
90,000	.25	29.41
100,000	.15	29.60
110,000	.10	29.72
120,000	.065	29.792
130,000	.045	29.833
140,000	.030	29.865
150,000	.020	29.885
160,000	.014	29.897
170,000	.010	29.906
180,000	.007	29.912
190,000	.005	29.917
200,000	.003	29.920

TABLE 52-A

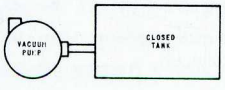
TIME REQUIRED TO PRODUCE VACUUM IN A TANK

"Hg. Vacuum	Pump Displacement in CFM. 3.6	7.2	12	20	41
6	.05	.03	.01	.008	.004
8	.07	.04	.02	.014	.007
10	.10	.05	.03	.020	.010
12	.12	.06	.04	.026	.013
14	.15	.08	.05	.032	.016
16	.19	.10	.06	.04	.02
18	.24	.12	.07	.06	.03
20	.31	.16	.09	.075	.035
22	.38	.19	.12	.08	.04
24	.47	.24	.15	.10	.05
26	.60	.33	.19	.12	.06
28	.85	.47	.26	.20	.10
29	1.1	.55	.33	.28	.14

Referred to 30" barometer

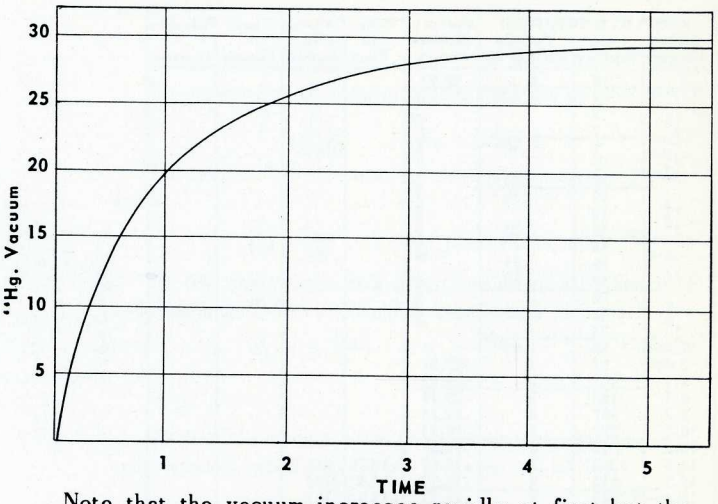
TABLE 61-A

In minutes per cubic foot of tank volume.



These figures are subject to variation depending upon the efficiency of the pump.

Typical Graphic Curve for Pumping Vacuum on a Tank



Note that the vacuum increases rapidly at first but the rate slows down as the vacuum approaches 30".

Figure 61-B

VARIATION OF VOLUME WITH PRESSURE

Gauge Pressure	Absolute Pressure	Ratio of Volume (Temp. kept constant)	Ratio of Volume (With no heat loss)
0	14.7 lb.	1	1
1 lb.	15.7	.94	.95
2	16.7	.88	.91
3	17.7	.83	.88
4	18.7	.79	.84
5	19.7	.75	.81
6	20.7	.71	.78
7	21.7	.68	.76
8	22.7	.65	.73
9	23.7	.62	.71
10	24.7	.59	.69
11	25.7	.57	.67
12	26.7	.55	.65
13	27.7	.53	.64
14	28.7	.51	.62
20	34.7	.42	
30	44.7	.33	
50	64.7	.23	

TABLE 53-A

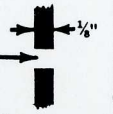
Example – If a certain volume of air is compressed to say 9 lbs. gauge pressure its volume will be .62 of its original volume if the temperature is kept constant and .71 if the temperature is allowed to rise without loss of heat. (In practice a figure between these two should be used.)

The above figures are based on an atmospheric pressure of 14.7 lbs. per sq. in.

$$\text{Formula} = \frac{\text{Atmos. press.}}{\text{Absolute press.}} \text{ (For ratio of volume)}$$

FLOW OF AIR UNDER PRESSURE THROUGH ORIFICES

Diameter of Orifice	Gauge Pressure in Pounds Per Square Inch												
	1/4	1/2	1	2	3	4	5	6	8	10	15	20	25
1/32	.037	.053	.077	.11	.14	.17	.19	.21	.26	.31	.42	.48	.54
1/16	.15	.21	.30	.43	.55	.65	.74	.84	1.0	1.2	1.7	1.9	2.2
3/32	.33	.47	.67	.98	1.2	1.5	1.7	1.9	2.3	2.7	3.7	4.3	4.8
1/8	.59	.84	1.2	1.8	2.2	2.5	3.0	3.3	4.0	4.7	6.6	7.7	8.6
5/32	.93	1.3	1.9	2.8	3.4	4.1	4.8	5.3	6.4	7.5	10	12	13
3/16	1.9	2.4	3.1	4.2	5.1	6.0	7.0	7.5	8.8	11.	15	17	19
7/32	2.1	2.9	3.7	5.3	6.8	8.0	9.2	10.5	12.	14	20	24	26
1/4	2.7	3.7	4.5	6.6	8.7	10.	12	13	16	18	27	31	34
9/32	3.5	5.0	7.0	9.6	12	14	17	18	20	24	38	44	49
5/16	4.0	5.7	7.5	11	14	17	19	21	25	30	42	47	53
11/32	4.4	6.3	8.8	13	17	21	24	26	31	36	50	57	64
3/8	5.6	8.0	11.	17	21	25	29	32	38	47	60	69	77
13/32	6.8	9.5	14.	20	25	30	35	37	45	53	70	80	90
7/16	7.8	11.	16	23	29	34	38	42	52	60	82	95	105
15/32	9.5	13	18	26	33	40	48	54	66	73	95	109	
1/2	10	14	20	29	37	44	50	57	71	81	107	123	
17/32	11	16	24	34	43	51	58	66	79	92	121		
9/16	13	18	28	39	49	58	67	75	90	105			
19/32	14	21	31	44	55	65	75	84	101	118			
5/8	16	23	35	49	61	73	83	94	112	132			
11/16	20	28	41	59	74	89	102	113	138	162			
3/4	24	34	49	72	90	107	123						
13/16	29	41	59	86	107								
7/8	34	48	69										
1"	44												



Cubic Feet of Free Air per Minute

TABLE 58-A

Coefficient = .60

VARIATION OF VOLUME WITH VACUUM

Absolute Pressure mm.	Absolute Pressure Inches Hg.	Inches Mercury on vacuum gauge	Ratio of Volume
0	0	30	Infinite
5	.2	29.8	150
13	.5	29.5	60
20	.8	29.2	38
25	1.	29	30
38	1.5	28.5	20
51	2.	28	15
63	2.5	27.5	12
76	3.	27	10
	5	25	6
	8	22	4
	10	20	3
	13	17	2.3
	15	15	2
	18	12	1.7
	20	10	1.5
	22	8	1.4
	24	6	1.25
	26	4	1.15
	28	2	1.07
Atmospheric Pressure	30	0	1.

With temp. constant

TABLE 54-A

Example – If a certain volume of air is expanded to 15 times its original volume it will be under 28" vacuum.

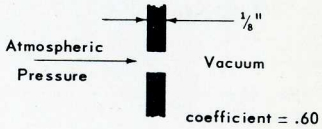
The above figures are based on a barometer reading of 30" Hg. Ratio of Volume figures are based on temperature of air being kept constant.

$$\text{Ratio} = \frac{\text{Atmos. press.}}{\text{Absolute press.}} \quad \text{– (For ratio of volume)}$$

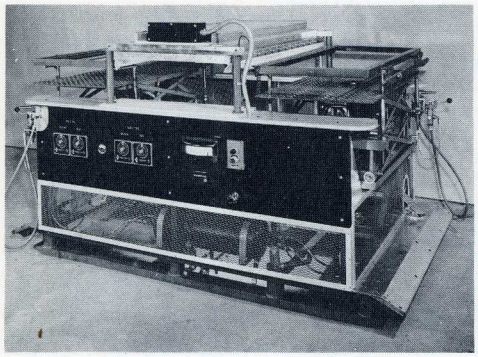
FLOW OF AIR THROUGH ORIFICES UNDER VACUUM

Orifice Diam.	Inches of Vacuum on Mercury Gauge														
	1/2	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1/16	.15	.21	.30	.33	.4	.45	.48	.52	.56	.58	.62	.65	.68	.70	.73
1/8	.6	.8	1.2	1.3	1.6	1.7	1.8	2	2.2	2.3	2.4	2.5	2.6	2.8	2.9
3/16	1.4	1.9	2.4	2.6	3.0	3.3	3.6	3.9	4.2	4.4	4.6	4.8	5.	5.3	5.5
1/4	2.3	3.0	4.2	5.3	6.4	6.8	7.5	8	9.3	9	9.6	10	10.5	11	11.3
5/16	3.5	4.8	7.3	8.3	10	11	11.5	13	13.5	14	15	16	16.5	17	17.7
3/8	5	7.5	10.5	11.5	14	15	16.5	18	19	20.5	22	23	23.8	24.6	25.5
7/16	7.5	10	13	16	18.5	21	23	25	26	28	29	31	32	33.5	34.8
1/2	10	13.5	17	21	24	27	30	32	34	36	39	40	42	43	45
5/8	15	21	27	33	38	43	46	50	52.5	55	59	63	65	68	71
3/4	22	28	38	41	56	62	68	72	77	82	86	90	95	100	103
Diam.	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
1/16	.76	.80	.83	.86	.90	.93	.95	.98	1.0	1.2	1.4	1.6	1.8	1.9	2.0
1/8	3	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4	4.1	4.2	4.3	4.4
3/16	5.7	5.8	6	6.2	6.5	6.6	6.8	6.9	7	7.2	7.4	7.7	7.9	8	8.1
1/4	11.6	12	12.5	12.8	13.2	13.5	13.9	14.2	14.6	15	15.3	15.6	16	16.3	16.6
5/16	18.5	19	19.5	20	20.7	21.3	21.8	22.3	23	23.5	24	24.3	25	25.6	26
3/8	26.5	27	28	29	30	30.5	31.4	32	32.7	33.5	34	35	36	36.8	37.3
7/16	36	37	38	39.5	40.5	42	42.5	43.5	44.7	45.5	46.7	47.7	49	50	51
1/2	47.5	48.5	50	52	53	55	56	57	58	60	61	62	64	65	67
5/8	74	75	78	80	83	85	87	89	91	93	95	97	100	102	104
3/4	106	109	113	116	120	123	126	129	131	134	137	140	144	147	150

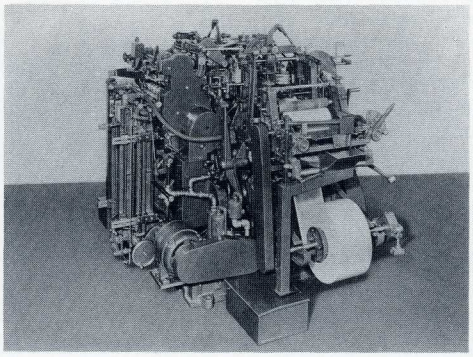
TABLE 57-A



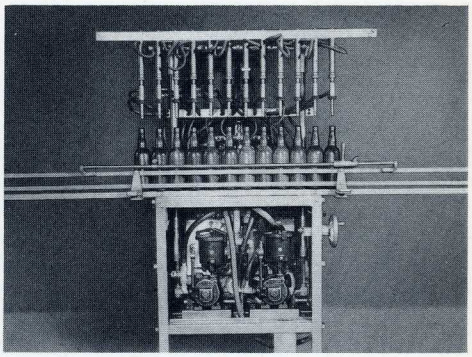
how LEIMAN pumps and motors are used



Any plastic form or shape can be duplicated by placing it in the vacuum suction box. A high vacuum of about 26 to 29" Hg. is maintained by the Leiman vacuum pump.

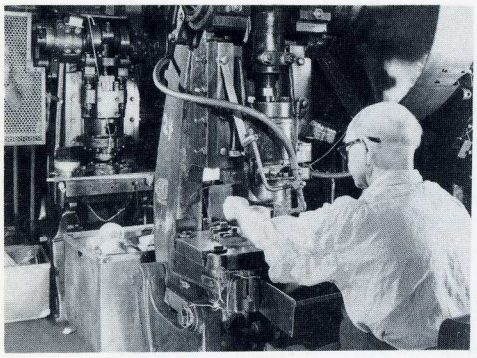


Air from a Leiman Air Pump helps to feed carton blanks into this double package making machine.

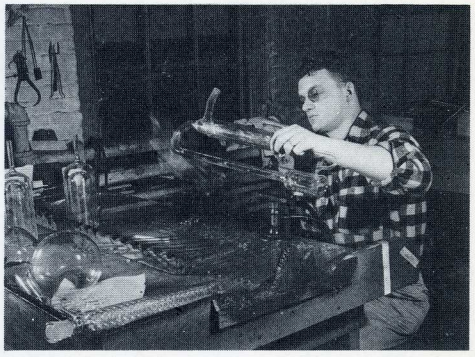


Vacuum filling of bottles and tubes requires that the air be first exhausted from the container. Two Leiman Air Pumps provide the suction for this purpose.

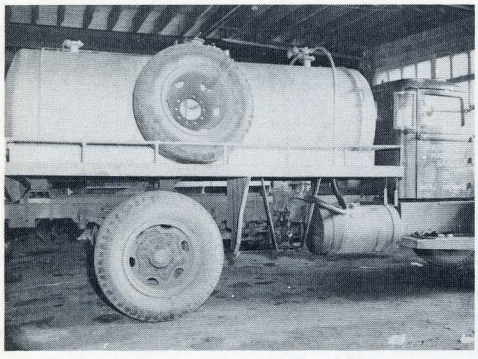
In industry today Leiman Pumps and Air Motors are universally accepted. Countless complex problems have been simplified through the use of Leiman products. Continuous, heavy-duty service and minimum maintenance and repairs are the reason for their outstanding reputation. Pictured here are just a few of the various installations in use today.



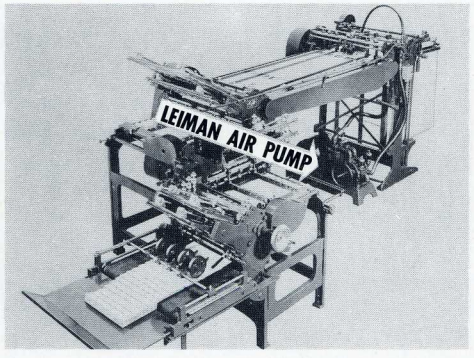
Finished stampings of light metal are ejected by air pressure, after fabrication, from a blanking press. A Leiman Air Pump furnishes the air.



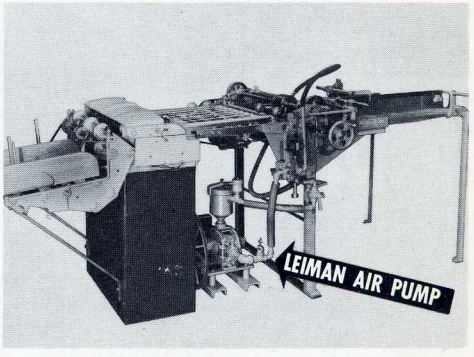
In this glassblowing operation a Leiman Air Pump provides a steady, dependable flow of gas and air to the burner.



A Leiman Air Pump mounted on a chemical tank truck supplies the air pressure needed to force the liquids from the tank.



A Leiman Air Pump furnishes the air required in the feeding operation of the new Baum folding machine.



A paper perforator and feeding unit is equipped with a Leiman Air Pump. One pump provides both vacuum and pressure for handling large sheets of paper.